BREAK-IN

January/February 2013

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

In this issue:

- Transmitting Antennas for 500 kHz; Part 2
- Product Review; MFJ-4416B Super Battery Booster
- Building a 1.2 kW Solid State PA for 144 MHz; Part 1
- Receiver Test Reports – what do the numbers mean?; Part 1
- NZART Council Elections 2013; Candidate's Biographies
- ZL Crossword 20

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*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

The *Break-In* team hope that all our readers had an enjoyable Christmas and New Year break. As usual Sheila and I enjoyed time with our families; this year Christmas in Dunedin and New Year in Auckland.

The past year has been a busy one for the *Break-In* team and whilst the amount of copy has been reasonable there is no room for complacency, this is still one of my biggest headaches. It is all very well knowing what our readers want but someone has to actually write it! So, do not hesitate to send us details of your latest projects, a review of a new rig, trials of a new antenna or a report of your local Branch's recent activities. We need your input !

Elsewhere in this issue you will find details of the current NZART Council elections. Do make sure you use your right to have a say in the conduct of NZART's affairs.

Writing for *Break-In*

These days most people will write their copy using a computer and word processor. Electronic copy has many advantages from the editorial point of view but here are a few do's and dont's that will make my editorial tasks easier.

- Received copy will normally be acknowledged within 1-3 days.
- All copy has to be reformatted by the editor to suit the specialised requirements for typesetting.
- Email copy is best sent by as an attached word.doc (*.rtf or *.txt files are also acceptable).
- If possible please do not send copy as PDF files; it involves a lot of unnecessary extra work converting them back into word.doc files. Note also that MS Publisher® files are not acceptable because they cannot be read or reprocessed/edited in MS Word®.
- Diagrams, graphs and photographs should be sent as separate attachments; as *.jpg or similar files. Please do NOT embed them in the text (because they are processed separately from the general text.)

Thanks for your cooperation and I hope this helps.

Stop Press

As I was writing this column on Thursday 10 January I was greatly saddened to learn of the passing of our former President Roy Symon ZL2KH. Speaking personally Roy was a good friend; I will miss his wise counsel.

73 *John Walker ZL3IB, Editor*

New Zealand Association of Radio Transmitters

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From The President

Vaughan Henderson ZL1TGC
<zl1tgc@nzart.org.nz>

Greetings and a Happy New Year to you all. I'd especially like to extend a welcome to those new members and previous members who re-joined as a result of our successful membership promotion last year. I am sure you will find membership of NZART to be very worthwhile and my thanks to you for joining and supporting our on-going work for amateur radio in New Zealand.

To our current members who have loyally supported the Association over many years, my thanks also go to you. Please remember that without you, NZART would cease to exist! The increase in our membership will help contain our operating costs, so your subscriptions will not increase and we will be in a much better position to focus on promoting and getting new people into our hobby of amateur radio.

With this issue of *Break-In* are your voting papers for the election of President and Councillors for the Midlands district for the two year term commencing in June of this year. I'm sorry we have not had more people willing to put their names forward in order that we might have an election in the other three electoral districts. Please, please take the time to vote to ensure that we have a competent team to represent your interests for the next two years.

Council meets once a month for an on-air meeting, held on the first Tuesday of each month at 1930 hours (2000 hours during daylight saving) on 3820 kHz. The first meeting for 2013 will be on Tuesday 5 February. In addition to the on-air meeting, Council also meets "in person" at least twice a year. The first of these "in person" meetings will be held on Saturday 16 February in the conference room at Wellington Airport. This central venue helps keep the cost of the meeting to a minimum and allows all Councillors to attend the one-day meeting without needing to incur the cost of overnight accommodation. The meeting will review and discuss our annual accounts, look in detail at the budget for 2014 and consider remits to our Conference in June. This meeting will also have a look at how we went in 2012, and how we as Council can improve the way we work, and importantly how we are delivering the service to you, our members.

Nominations for 'Amateur of the Year' and 'Young Amateur of the Year'; is there someone in your club who has done an outstanding job, be they old or young? It's not too late to put in a nomination, but please do so now! It is also time to start thinking about nominations for the Jumbo "ZL1HV" Award. Applications for this award close on 1 May 2013 at HQ.

It's also not too soon to start planning to attend next year's AGM and Conference at the Copthorne Hotel and Resort, probably better known to many of you as the Solway Park on High Street, Solway, Masterton. Queen's Birthday weekend 2013 is over the weekend of June 1, 2 and 3. Wairarapa Branch 46 who are hosting the event now have a web site up and running and the registration form is available from the web site at <www.nzartconference2013.co.nz>. A special rate is available for accommodation at the Copthorne. See elsewhere in this issue of *Break-In* for more details.

Vaughan Henderson ZL1TGC
President

Next deadline for copy is
10 March 2013

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31 May – 2 June 2013

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Ring Copthorne Hotel on 0800 765 929 or email <reservations@solway.co.nz> and quote the group booking reference number **67866** for a flat rate for any room (standard and luxury)of $145 per night. There is also free parking available for campervans (non powered site) at the location.

There are also plenty of other hotels and motels no more than 10 minutes driving time from the venue to suit your budget.

Forums: If you are interested in running a forum or would like to see a particular subject for a forum, please don't hesitate to contact the organising committee.

Please contact the committee for further information or suggestions at <info@nzartconference2013.co.nz> or visit the conference web site <nzartconference2013.co.nz> or Postal address of Branch 46 NZART Conference 2013, PO Box 860, Masterton.

See you there.

Break-In 50 Years Ago

Craig Crawford ZL3TLB

***Break-In* February 1963; Lasers – New Power from Light**

(Reprinted from Electronic Age)

On May 9 this year a team of research scientists at the Massachusetts Institute of Technology made final adjustments to a complex of optical and electronic instruments set up on the campus grounds. One of the scientists touched a button and instantly a flash of red light shot upward, briefly etching its path in a layer of unsuspected haze as it raced towards the moon.

Three seconds later it had burst on the lunar surface southeast of the crater Albategnius and been reflected back to MIT where its return was duly noted in the sensitive photomultipliers of a telescopic receiver. For the first time in history man had built a light strong enough to illuminate a celestial body.

Far brighter than the sun, the light beam that made this unprecedented 478 000 mile round trip was emitted from a six inch ruby rod no thicker than a lead pencil.

Able to amplify light waves just as radio waves are amplified, lasers already foreshadow an era in which light beams may be used to guide vehicles, communicate between planets, perform delicate eye and brain surgery, weld and machine metals, destroy hostile missiles in flight and detect enemy submarines on the ocean floor.

Right now, for example, scientists in RCA laboratories and manufacturing divisions are performing a laser radar for battlefield use, a laser tracking system for monitoring the flight performance of US missiles, and a laser computer which may operate literally at the speed of light. Also RCA scientists are deeply engaged in developing a laser communications system which, in theory, could use a beam of light to carry all the radio, television and telephone broadcasts currently transmitted throughout the world.

NZART Council Elections 2013; Candidates Biographies

Presidential Candidates

John Andrews ZL2HD

John was first licensed as a teenager with a novice call, and has been an active radio amateur for more than 30 years. Amateur radio led to John completing a BSc in Physics and then entering the IBM graduate program, later transferring to IBM in the Middle East. During this time he continued his education completing university papers in astronomy, management and accounting, as well as leading desert trips and travelling to many parts of the world.

He returned to ZL to work in the microwave radio industry, creating a million dollar per year software business.

John has spent several years working with trusts supporting youth and disabled sailing, as a professional sailing coach for clubs and sailing academies, as well as racing and offshore sailing. He has gained formal qualifications as a sailing instructor, and works weekends and evenings skippering charter boats. He is actively involved with AREC, Civil Defence and Land SAR as a search manager, as well as being a founder and chairman of Wellington Wander Search, a group setup to provide radio tracking of people who "wander" due to Alzheimer's or autism.

He is an amateur radio ARX, has organised and run classes to bring many newcomers into Amateur Radio and to the Association. He is a repeater trustee and actively works to introduce technology to schools and other youth groups. John now works in a management role in the wholesale electricity market with NZX Group.

John's time with NZART has seen him work to improve the services to members and branches, as well representing amateurs at the Environment Court. He has supported the editor in the increased use of colour in *Break-In*, led the establishment of the role of National Training Officer, and worked with RSM staff on a number of issues.

When elected as president, John will work on the important and pressing hard issues that must be faced such as making it easier for people to become radio amateurs; to reduce the cost of membership of NZART and improve NZART's support for issues such as district plan reviews. He will work to increase member's and amateur's privileges and benefits.

John brings valuable experience, leadership and management skills to NZART and to Amateur Radio. He seeks your support and will continue to work hard to make NZART more effective, more professional and transparent in its operations.

John Andrews ZL2HD

Vaughan Henderson ZL1TGC

First licenced in 1968, my amateur radio activity to date has been mainly on the VHF and UHF bands. The level of QRM at my QTH in Auckland precludes anything except local operation on the HF bands! As time permits, I enjoy construction of electronic and amateur radio related equipment as well as taking a keen interest in new technologies and their impact on amateur radio.

I have enjoyed a varied technical career, starting as a telecommunications technician, followed by some 14 years as a computer network engineer. From there, moved into marine electronics and am currently self-employed as a marine electronics engineer, mostly working on maintenance and re-fits of larger recreational and commercial vessels. I am married with two adult children and two grandchildren.

I have been a member of NZART Council from 1981 to 1985, and again from 1991 to 1998, served as Vice-President from 1999 to 2002 and again from 2006 until early 2011 when ZL2KH's resignation as President resulted in my becoming the "un-elected" President for the balance of the current term in accordance with the constitution. This time as President has been a very useful "apprenticeship" for me, and has given me the confidence to ask for your support, to elect me as your President for the next two years.

If successful, I want to do more to actively promote amateur radio; to encourage Branches to recruit new members leading to an increased membership of our national association. With an increase in membership, we can then look at the opportunity to reduce subscriptions or improve the benefits of belonging to NZART. I also want to improve the level of communication between Council and the membership, to try and keep all members better informed on current issues. There is no "magic wand" that will solve all the challenges facing us as radio amateurs but by taking a positive approach to our future, and with your support, I hope to be able to continue to lead a progressive Council, focused on providing added value to you, our valued NZART members.

Midland Electoral District (2 required)

Phil Holliday ZL3PAH

My personal aims for NZART.

To manage and reduce the risk for the society through good governance and good financial management. I believe this includes a need to redefine the direction NZART is to take in the future and to agree the tactics needed to achieve this.

To understand and then manage the current problem associated with an ageing membership – and particularly to work out strategies to bring new blood into the hobby.

To work with the rest of Council as a cohesive team to discover and deliver the services you want rather than what Council may think you want.

About me. If it had not been for ham radio I doubt I would have chosen the same career path and would not have enjoyed the success that I have. I have a BSc in electronics. Married to Maggie, we have 5 children between us. Now aged 65 I have been licensed since 1965 first as G3UVZ and since 1990 as ZL3PAH. I am a committee member of Br 56. I am a keen, active HF band DXer, contester and recently joint founder of the ZL3X Quake Contesters Group. I now feel it is time for me to put something back into the hobby that has given me such pleasure over the years.

I have spent the last 40+ years in industry starting out as an RF development engineer designing equipment from 500 kHz to 1.6 GHz, later as a software engineer and progressing to chief engineer and technical director of various companies in the UK. On emigrating to NZ I started my own company (Holliday Group) which I sold to a UK listed company 10 years later. I then invested some of the proceeds of the sale into other New Zealand technology companies, one of which we have recently sold to a very large US corporation. I have extensive financial, management and governance experience both at CEO and at board level. I am a director of

several companies, have until recently chaired PowerHouse, the Christchurch technology incubator and Angel investment fund and am an Operating Partner in a successful Auckland Venture Capital company. I am currently reducing the time I spend working as I head to semi-retirement and if elected to Council will have both the skills and time to spend to make progress on the aims above.

Following the resignation of an elected Council member I was co-opted onto Council about 6 months ago and have enjoyed the learning experience and the start I have made to the task in hand. I am not a political animal, have always seen politics in organisations as a destructive force and do not engage in that type of behaviour. If elected I will be looking to represent your views and wishes – but I can only do that if you tell me what you want. My email is <phil@cliftonbay.co.nz>

Phil Holliday ZL3PAH

Ann Fraser ZL3TNT

Greetings fellow Hams. I am Aprilan (Ann) Fraser, call-sign ZL3TNT, and I am married to David ZL3AI. We have one son, John ZL3UFO, and live in Waipara, North Canterbury. I have previously been NZART Councillor for Midlands, but resigned for personal reasons. I am a member of Branch 68, North Canterbury, and have served on the committee for a number of years now in a variety of positions. I am also secretary of the Canterbury Combined Branches Forum.

During my previous term on Council I tried to act in the best interest of the hobby and to keep members informed of what happens. I am very keen to see Amateur Radio progress in this technological age we are in.

It is my hope to represent you fairly and honestly over the next two years and will be happy to attend meetings of your club should you ask me to. I will, most certainly, do my best to answer your queries and address any concerns you may have.

If you would like to know more about me feel free to visit my website <http//:annfraser.weebly.com>

Ann Fraser
PO Box 12, Waipara
North Canterbury 7447
<zl3tnt@yahoo.com>

Stuart Watchman ZL2TW

I am a 47 year old father of two and grandfather of one. A former NZPO radio and telephone technician I have worked for the past 15 years in the emergency department of Blenheim's Wairau hospital. My mixed background is very helpful on council: technical knowledge, and from working in the front line: the ability to keep a clear head and spot BS when I see it.

I have previously served on NZART council from 2005 to 2009, including holding the position of vice President from 2007 to 2009. In 2011 I volunteered to fill a council position made vacant by a resignation, then was elected by my council colleagues to fill the position of Vice-President when Vaughan Henderson was made President.

If I were re-elected to council and Vaughan were re-elected to the position of President I would again put my name forward to be available for selection for vice president.

I believe the most important role of a councillor is to ensure the good governance of NZART, irrespective of the councillors radio interests, personal interest or branch. If re-elected I will continue to act in the best interests of all NZART members.

I am actively involved in the Marlborough amateur radio club, often helping organise communications for sporting events, AREC and construction of equipment. I manage the Jock White field day and actively participate in this great event as part of the Marlborough team, my main burst of CW activity for the year!

Stuart Watchman ZL2TW

The New Zealand Association of Radio Transmitters
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Elections 2013

Elections will be held in February/March 2013 for the following positions on the NZART Council: President and Councillors representing the Midlands Electoral District.

Nominations for the positions on Council have been received from:

President (1 Required)
John Andrews ZL2HD
Vaughan HendersonZL1TGC

Northern Electoral District (3 Councillors Required)
Neill EllisZL1TAJ
Stephen HaymanZL1TPH
Phil King ZL1PK

Central Electoral District (3 Councillors Required)
Warren HarrisZL2AJ
Fred JohnsonZL2AMJ
Ted LinneyZL2TB

Midlands Electoral District (2 Councillors Required)
Ann FraserZL3TNT
Philip HollidayZL3PAH
Stuart WatchmanZL2TW

Southern Electoral District (1 Councillor Required)
Terry ThomasZL4TAE

No election is required for councillors representing the Northern, Central or Southern Electoral Districts as the nominations received in each district equals the number of councillors required.

All association members entitled to vote will therefore receive a ballot paper for the Presidential Election. The Ballot paper for Association members from within the Midlands District will be included with the ballot paper for the election of the Association President.

Those members entitled to vote who receive *Break-In* will receive their voting paper, instructions and envelopes with the January/February edition of *Break-In*. Other Association members who do not receive a personal issue of *Break-In*, but are entitled to vote will have the respective paper and envelopes mailed to them.

Evan T Sayer
Returning Officer
8 January 2013

Editorial note:
It is hoped to print short biographies of all Councillors in a future issue of *Break-In*.

Transmitting Antennas for 500 kHz; Part 2

by David Conn VE3KL

Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to <www.rac.ca/tca. Jan/Feb 2012>

Introduction

Part I of this series introduced the main issues associated with the performance of small antennas for operation at 500 kHz. The article focussed mainly on the radiation resistance of several antenna types and their expected efficiency. This part goes on to discuss another extremely important aspect of these small antennas: bandwidth.

Unfortunately, as the antenna size approaches zero, the bandwidth and efficiency also approach zero making the antenna useless even if it is possible to supply enough current to radiate some power. It is shown that the antenna length should be larger than 0.025 wavelengths, 15 metres at 500 kHz, for effective operation. This is only a rule of thumb which depends on the antenna type and ground losses.

Background/Review

Short vertical monopoles (see Figure 1) come in two major flavours: with and without a top hat. These and other antenna types were discussed in part I of this series.

A typical antenna with a top hat (see Figure 2) is usually base fed with an isolated vertical element and a large top hat that increases the radiation resistance and antenna capacitance. These increases translate into greater antenna efficiency and increased bandwidth.

The radiation resistance of several vertical monopoles (see Figure 3) increases as the square of the antenna length. For a short monopole, the radiation resistance is given by:

$$R_r = 40\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

Note that the radiation resistance for a vertical monopole with a length of 0.05 λ is only 1.0 Ohms.

The radiation efficiency is given by:

$$\varepsilon = \frac{Rr_{ad}}{Rr_{ad} + R_{loss}}$$

If an antenna has a radiation resistance of 1 Ohm and a loss resistance of 9 Ohms, then the efficiency is 1/10 (-10 dB). This means that the antenna gain will be 10 dB less than the same antenna with zero losses (ground plus copper).

The main design issues with 600 metre antennas are:

- The radiation resistance
- Resistive losses caused by non-perfect ground and wire resistance in the antenna and its matching structures
- The operating bandwidth
- The design of matching structures, and
- The antenna gain

Antenna Bandwidth

Definition of Bandwidth. There are several ways to define the bandwidth of any circuit including antennas. The most common method is the 3 dB bandwidth which is commonly used for amplifiers and filters.

A low frequency amplifier that responds from zero Hz to 1 MHz has a 3 dB bandwidth of 1 MHz if the power gain is down 3 dB at 1 MHz.

For antenna systems where we commonly measure performance in terms of SWR or Return Loss it is more meaningful to define the bandwidth in terms of SWR or Return Loss. I use the SWR method for most of my work. The SWR bandwidth is defined as the frequency range between frequencies where the SWR reaches a certain limit such as 1.5:1 or other appropriate value. Most solid state transceivers operate well without an antenna tuner for an SWR up to 1.5:1. Here it is assumed that the antenna is matched to an SWR of 1:1 at the center frequency. See TCA Hotlink,2 for the derivation of the formula for the SWR bandwidth which is given below.

$$B = \frac{SWR - 1}{\sqrt{SWR}}\frac{R}{Xo}fo$$

Where:

- *B* is the bandwidth in Hz.
- *SWR* is the maximum Standing Wave Ratio allowed by the system.
- *R* is the total resistance at the

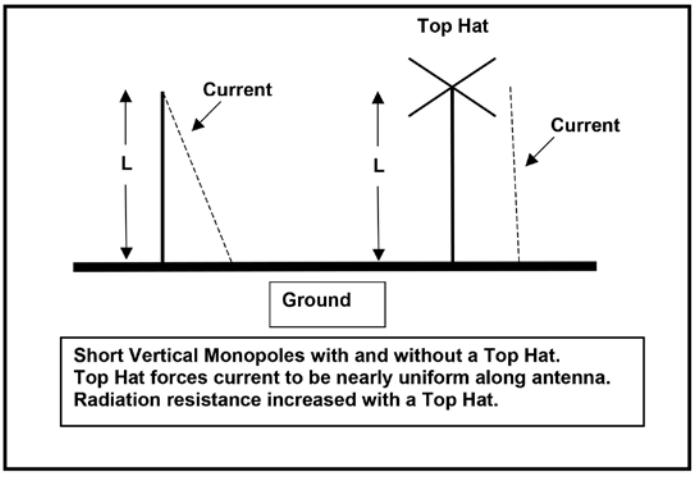


Figure 1. Short Vertical Monopole Antennas.

Figure 2. Photograph of SM6BGP 500 kHz Antenna.

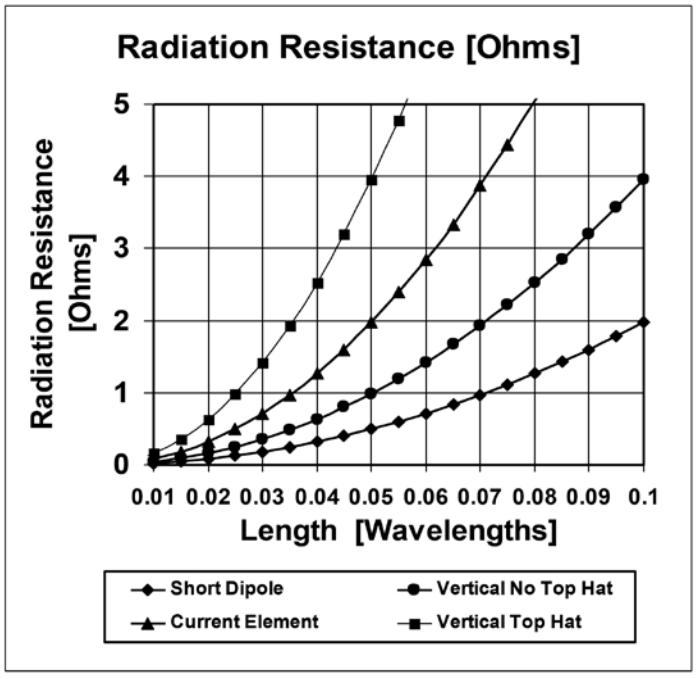


Figure 3. Radiation Resistance of Basic Antennas.

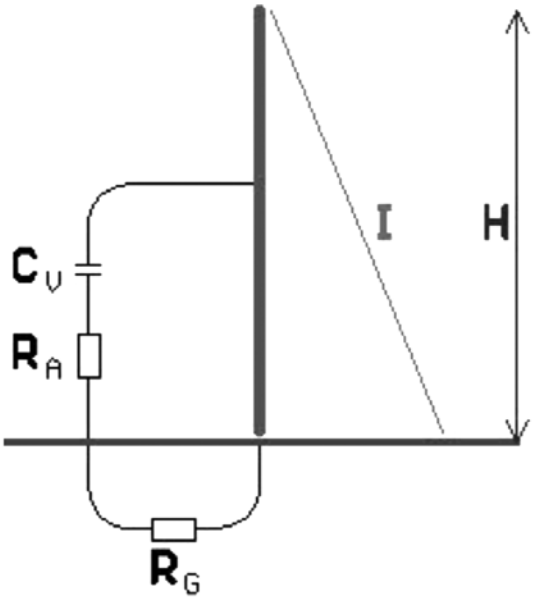


Figure 4. Circuit Model for A Vertical Antenna: no top hat.

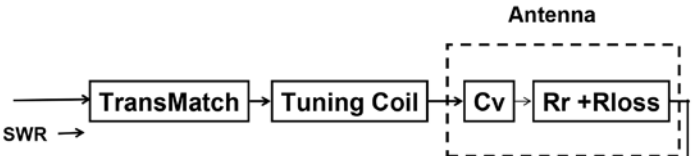


Figure 5. Circuit Model Including Tuning Coil and Transmatch.

antenna terminals including radiation and loss resistances.

- *Xo* is the reactive component of the antenna impedance as measured at its terminals. Here we assume that the antenna is not resonant and can be seen as a resistance in series with a capacitance.
- *fo* is the center frequency in Hz.

For example: If *fo* = 500 Hkz, *R* = 25 Ohms and *Xo* (magnitude) = 3000 Ohms, then; *B* = 0.93 kHz for an SWR limit of 1.25:1

To understand the above formula refer to Figures 4 and 5. As shown in Figure 4, a short vertical antenna can be modelled as a capacitance in series with two resistors. The resistors include both the radiation and loss resistors. The antenna itself is therefore not resonant (there is no inductive component). Figure 5 shows the complete circuit including the antenna, a tuning coil used to resonant the circuit and a Transmatch which is used to set the input impedance to 50 Ohms. Hence, the SWR at the resonant frequency equals 1:1.

Antenna Capacitance

In order to calculate the bandwidth of the antenna, It is necessary to find the capacitance as well as the total resistance. The capacitance of a vertical monopole with no top hat is given by the following formula:

$$Cv = \frac{24L}{\log\left(\frac{1.15L}{d}\right)}$$

Where:

- Cv is the capacitance in pF
- *L* is the length of the antenna in metres
- *d* is the diameter of the antenna in metres

As a example, consider the following:

L = 30 metres, d = 0.001m, then: *Cv* = 158 pF and $X = 1/(2\pi foCv)$ = 2015 Ohms

The capacitance of other antenna types can be calculated using similar formulas (see TCA Hotlink, 2).

Universal graph for antenna bandwidth

For a given operating frequency, 500 kHz, in this case, the bandwidth depends only on the resistance and the reactance of the capacitor at the operating frequency. This is shown in Figure 6 where the bandwidth is plotted as a function of *R/Xo* for the special case of 500 kHz operating frequency. For example, consider the case of a simple vertical monopole where the total resistance is 20 Ohms and the reactance is 2000, then the system bandwidth equals 5 kHz for an allowable SWR of 2.5:1

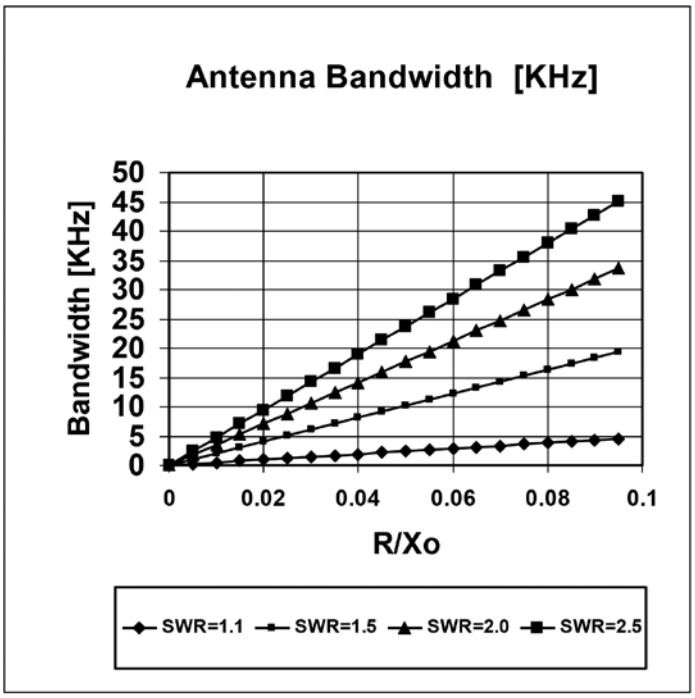


Figure 6. Antenna Bandwidth Plot.

As shown on the graph, the bandwidth increases as the ratio of *R/Xo* increases and also increases as the allowable SWR is increased. The goal of most antenna designers is to increase the radiation resistance and reduce the capacitive reactance, *Xo*, by using top hats and other configurations as discussed in the first part of this series.

Please note that for the 500 kHz band, a significant bandwidth is not needed. Typically, the whole band may be only 5 kHz wide. The bandwidths shown in Figure 6 are far greater than would be necessary for operation in this band except for values of *R/Xo* less than 0.01 for a VSWR equal to 1.5. However, the trends show that an antenna can be made quite small at the expense of bandwidth and antenna efficiency.

Case Study: a short vertical monopole simulation

As well studying the basic formulas given above, I also performed a simulation using EZNEC (NEC-4) software which can handle buried radials. Simulation methods can handle specific structural detail which the formulas do not but simulation methods give little insight into the basic performance. The antenna that was simulated is given below:

- Length/λ = 0.05
- Number of radials = 16
- Radial Length/λ = 0.05
- Average ground conditions

The simulation was scaled to 14 MHz by adjusting the dimensions so that the length to wavelength ratio remained constant. This is a common simulation technique that is reasonably accurate and eases the simulation problems associated with very small dimensions that occur with buried radials. In a final design it is best to use the actual operating frequency before building and testing.

The antenna (see Figure 7) has the following characteristics:

- The antenna gain = - 8.45 dBi
- Take-off angle = 30 degrees
- Input impedance = 7.1 - j1329 Ohms at 500 kHz for a 30 metre high antenna
- Bandwidth = 2.53 kHz for an SWR of 2.5:1 at 500 kHz.

Conclusions

Part I of this series focused on the issues of achieving a large radiation resistance which will aid in producing a reasonable efficiency and operating bandwidth. Part II of this series focussed on the bandwidth of these small antennas. The four main design parameters of these antennas (radiation resistance, efficiency,

continued on page 8

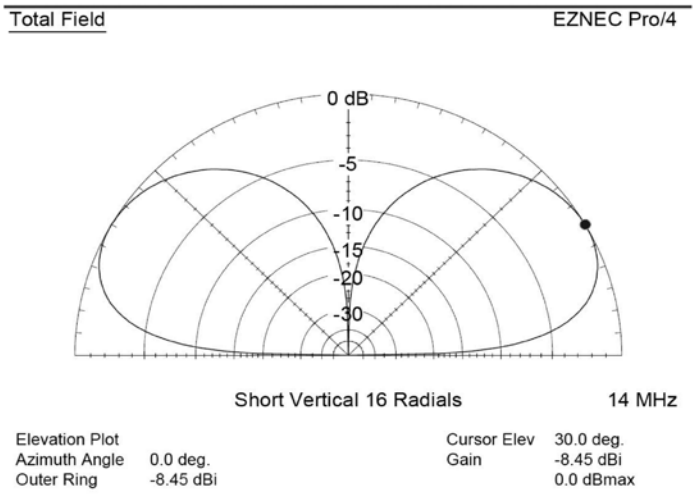


Figure 7. Antenna Pattern Plot.

◄ *continued from page 7*

bandwidth and gain) were covered in the series.

The main contribution from part II is the bandwidth analysis of small non-resonant antennas which show how small the operation bandwidth can be for these antennas.

The universal graph covers the range of most practical antennas.

There has been a great deal of work done (see TCA Hotlinks,1, 2, 3, 4, 5 and 6) on Low-Band antennas. The most significant work to date on Broadcast antennas was done by Star-H Corporation, TCA Hotlink,1 where they developed a low profile cage type antenna that was described in this series. TCA Hotlink, 2 by ON7YD is highly recommended. It contains a complete discussion of many antenna types such as: helical antennas, spiral top loaded antennas, capacitive top loading on a single tower antenna and much more.

The classic book by ON4UN (see TCA Hotlink, 5) is indispensable for antenna designers who are interested in Low-Band antennas and systems. It also covers many of the basic concepts such as the effective height of an antenna.

It is well worth looking at the very impressive 500 kHz antenna of Gunnar Ivarsson, SM6BGP and his Web site (see TCA Hotlink, 4). Gunnar uses a base-insulated tower that is 24 metres high. It is insulated at the base with four precision machined Delrin insulators. There is a beautiful photograph of the antenna on his web site which was taken at sunset in December. Gunnar reported to me that the impedance of the antenna at its base before matching is 22 Ohms. Under some conditions, he uses the transmitter as a beacon at 501.4 kHz.

There are many other considerations to explore with these antennas including, input impedance, bandwidth, efficiency and the design of matching structures. Ordinary methods of matching these antennas are not very practical for amateurs and we must devise simple, low cost methods. For example, it is quite common to employ quarter wavelength lines to match impedances but in this case the lines would have to be extremely long.

Although this series concentrated on vertical antennas, there are several others that are well worth considering, especially if you have enough land to erect one since they are usually ¼ wavelengths long.

Further Study Using TCA Hotlinks

Further information is provided with TCA Hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink 1 A Novel Short AM Monopole Antenna with Low-Loss Matching System. <http:// www.kintronic.com/resources/ technicalPapers/2.pdf>

TCA Hotlink 2 Antennas for 136 kHz. <http://www.qsl.net/on7yd/>

TCA Hotlink 3 Symmetrical Top Hats. <http://cebik.com/content/ gp/hatp.html>

TCA Hotlink 4 500 kHz Antennas SM6BGP. <http://500kHz.se/>

TCA Hotlink 5 ON4UN's Low-Band Dxing Text Book. <http://www. arrl.org/>

TCA Hotlink 6 Inverted L Antennas. <http://www.antennex.com/ preview/archive3/ltv.htm cebik>

Acknowledgements

The author wishes to thank Justine Sider, P.Eng., of Industry Canada for allowing me to use the NEC-4 software at her facility for the study of Amateur Radio Antennas that use buried radials.

Thanks are also due to the STAR-H Corporation for sharing information on their novel small broadcast antenna and to Radio Amateurs Canada for encouraging my research into this area.

Until later,

VY 73 *David, VE3KL*

100 Basic Electronic Projects—on CD-ROM

THE booklet 100 Basic Electronic Projects was produced by the NSW Division of the Wireless Institute of Australia in 1982. It has been copied to CD-ROM on behalf of the NZART Radioscience Education Trust with the kind permission of Wireless Institute of Australia, NSW. Surprisingly, it is still very current with lots of simple projects and clear explanations about how they work. It should be a source of inspiration for budding scientists and engineers. It should energise youngsters towards thinking about radio and radio topics. Even if they never build anything, just looking at the circuits and their applications could bring on ideas!

The projects can be examined on-screen and those selected for closer interest can be printed off by a right click of the mouse then another click to Print picture. Simple! The book, all 114 pages, appears on-screen exactly as it does on paper. It is purposeful without needing any fancy updating or modernising. The circuits are very simple, the diagrams clear, the go-first-time factor will be high, costs low, all components are substitute-able.

A four-page booklet can be printed from the CD describing how to make your own Electronic Test Bench. Any youngster can build one and then fabricate selections from these 100 circuits. Standard components are used and these are many-times re-usable.

A CD will be made available on application to the Trust at 38 Bell Street, Featherston. As the Trust relies on donations for its investments a small donation would be appreciated. Donations $5.00 and over are tax deductible. Order promptly as there is a limited supply.

This CD can be freely copied. Branches could donate umpteen copies of the CD to local schools as an Amateur Radio promotion to encourage youngsters towards an interest in radio and electronics. Bags of common-value components could be assembled as give-away starter packs for the electronics test bench to encourage those who show interest.

Every kid in the country needs one!

Encourage youngsters and support the NZART Radioscience Education Trust.

73, Peter Norden ZL2SJ
For NZART Radioscience Education Trust

Product Review: MFJ-4416B Super Battery Booster

by Stuart Watchman ZL2TW <clareandstuart@xtra.co.nz>

Problems can occur when operating HF SSB equipment at 100 watt power levels from a storage battery. A typical 12 V lead acid battery will have a terminal voltage of 12 V quite soon into its discharge yet have plenty of capacity remaining. Your average DC connecting lead will drop a few tenths of a volt: the combination results in a lower than ideal voltage at your transceiver. Many sets will protest with distorted transmit audio. The MFJ-4416B "Super Battery Booster" is one of several products available that will solve this problem and is looked at here.

I am sure there are many like myself who have the on-air result of insufficient voltage supplied to an HF SSB set: badly audio distorted This is not an uncommon event during the Jock White Field day and occasionally during car rallies, when the rally base can be heard saying "you need to run your engine" to get the battery voltage back to an acceptable level.

When a lead-acid battery in the average vehicle is being used with the engine not running it does not take long before the terminal voltage is falling to near 12 V, and this is with a battery that has only been partially discharged. A lead resistance to the battery as 'high' as 0.025 ohm will give a voltage drop of 0.5 V on 20 amp voice peaks. The situation can occur with plenty of battery capacity left yet your HF set is seeing a voltage of 11.5 or less and falling.

While operating 'stationary mobile' off the vehicle battery starting the engine periodically will fix the problem, of course you have to keep an eye on the voltage here for two reasons: to avoid distortion issues and also to avoid the embarrassment of a flat battery unable to start the engine.

Many portable operations use a storage battery separate from the main engine battery to avoid the 'flat battery' problem above, however all the low supply voltage issues remain. With my participation in the Silver Fern car rally approaching, a marathon week-long event around the central North Island I decided to use this approach: a large sealed lead acid storage battery which I could charge each night and purchase an MFJ-4416B battery booster to fix the supply voltage issue. (I have set up an Oatley Electronics solar charger between the vehicle battery and the portable battery to allow charging while mobile)

The MFJ-4416B contains a DC-DC inverter to boost the supply voltage to a constant voltage adjustable from 12 V to 13.8 V and is rated at an output current of 25 A peak. Supply side voltage sensing sounds an alarm at selectable 9, 10 or 11V, default is 10. The user can opt for the unit to shut down if that low volt set point is reached.

It is important to keep in mind that the unit cannot 'create' power, in other words more current will be drawn off the battery than is supplied to the radio to keep power in and out of the unit equal. There is also a power penalty in that the unit has a percentage efficiency ranging from the mid 80's to the mid 90's depending on the output voltage set and the supply voltage e.g. 13 V out at 20 A and 90% efficiency with a supply voltage of 11.2 V will require 25 A from the battery. If you are running your battery voltage down discharging will occur at an ever increasing rate for a given current drawn from the unit in boost mode.

During receive the unit draws approximately 200 mA or so extra, which is wasted power; a feature allows the inverter to be turned off on receive. An SO-239 connector with a high impedance on the device can be connected by a short link to a coax T in the transceiver (the length of the coax from the 'T' to the unit must less than 1/16 wavelength to prevent RF shunting issues which also makes this facility unusable at VHF/UHF). When RF is sensed the device goes into boost mode, and after an adjustable delay it goes back to passive when transmission ceases. A switch allows the unit to be left in permanent boost mode.

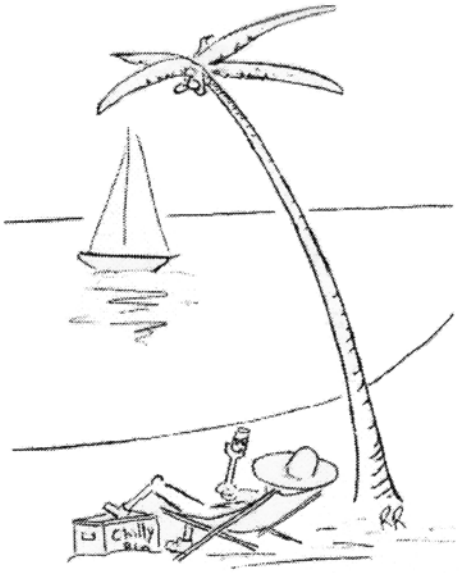
The DC connections to the unit are flexible, both input and output are either via binding post/banana plugs or Anderson power pole connectors.

Testing shows that the unit functions exactly as advertised. I was a little concerned that RF hash may be an issue from the DC-DC switching but was relieved that not a squeak can be heard from it. A check on the DC output terminals with a 100 MHz scope showed that any switching hash was down in the noise picked up by the scope leads. I soak tested the unit by loading with my tapped 'battery killer' bank of old motor control resistors with a continuous 16A load for 5 minutes, the case only became moderately warm.

The DC voltage drop through the unit with boost disabled was 0.2 V at typical receive current levels i.e. less than 1 A with my FT897, however on transmit the drop was 0.8 V on voice peaks; clearly transmit operation with the boost disabled is not a good idea.

An accessory unit from MFJ is available which provides remote control and voltage monitoring via an RJ connector. The manual includes a circuit of the unit showing the remote connector wiring, a keen constructor could put together the remote unit with this information. This is where I found my only concern with this unit, the DC input and output are wired directly to the RJ connector for remote metering, these lines should have a low value fuse, a short in the remote unit could result in smoke and flames.

Overall I am impressed with the MFJ-4416B, and is good value at $US 149.95. I look forward to giving it a thorough workout during the Silver Fern rally. βi



Look OM, its "dB over Isotropic"
NOT
"DB on ice in the tropics"

Building a 1.2 kW Solid State PA for 144 MHz; Part 1

by Simon Lewis ZL4PLM

Ever since I was licensed in the late 1970's I have held a deep fascination for operating in the VHF and upper part of the spectrum. For many HF operation remains a major part of their ham radio activities but for me, I just love VHF!

I am continually fascinated by the vast array of propagation modes that operating in the VHF-SHF spectrum offers. I mean who can't be excited by working the world on F2 on 50 MHz? Or working 1000's of miles by bouncing signals off meteors as they burn up in the atmosphere? The amazing ghostly whispers of an aurora signal never cease to amaze me when I hear it, and when there was that major Sporadic Es opening last January; well I was wearing a grin for days!

I see moonbounce as a kind of 'final frontier' of the VHF-SHF operator and with that in mind I set out to build myself a high power 2 m EME station in 2012 which was encouraged by the GURL change which increased our power limits to 1 kW.

Like many VHF-SHF operators I discovered at an early stage in my radio career that whilst QRP and small antennas will produce some great results very occasionally, to work DX on flat bands and to push the envelope using weak signal working requires both large amounts of aluminium in the sky and power. And the more power the better! Weak signal operators will also tell you that ERP counts for everything, but of course as part of a matched system with a good receiver and preamps fed with low loss coax.

So as part of my VHF-SHF stations I have always employed the use of high power amplifiers to ensure I maximise my station's capabilities.

Until very recently high power amplifiers at VHF-UHF have invariably used tubes and there have been many great designs over the years in *QST* and the *ARRL Handbook* that have been the mainstay of many a weak signal operator's station. Some of these designs are pretty old but still as relevant today showing how robust the designs were. Over the past 10 years or so we have seen an increase in the availability of tubes from the former Soviet Union and these high power tubes have gradually found their way into both home-brew and commercial designs. But even these tubes are now starting to get expensive and with the free market of the Internet the demand on these components has led to a slow but gradual increase in component cost.

ZL4PLM's 2m solid state power amplifier.

Valve vs Solid State?

For the past few years I have been using a tube amplifier for 144 MHz that used a Russian triode, a GS35B. While the amp works very well and delivers the power it has a number of drawbacks over a solid state PA.

Firstly, it's quite noisy; well that's what happens when you force air through a small cavity using a big fan! Secondly, it's big. It weighs over 25 kg; not really portable. Again not much you can do, there's a cavity housing a lump of copper anode cooler, a big hunky transformer, a capacitor smoothing stack and everything gets big and beefy when you're trying to manhandle 3.5 kV at an amp or so.

And yes, 3.5 kV is definitely a drawback, and actually out here in the sticks on the Canterbury plains it's a big downside that has caused me all sorts of issues. Our mains line voltage isn't very high at the house. By the time it's made its way up from some way down the roadside and onto the property here, and through the house and out to the shack it can be as low as 210 V. That's not helped in winter either, when the house is getting heated and so are everyone else's and the mains drops further.

So the EHT voltage can drop below 3 kV as the amplifier came from Europe where the line voltage is much higher and people tend not to live on the end of kilometres of power lines. That tended to lower the output power below the 1 kW level.

Another drawback is that they also tend to suffer from tuning drifts when using 100% duty modes. Using the amplifier on SSB or CW its fine; set it and forget it, but on FSK441 or JT65B when you are transmitting for 30 second or 1 minute periods then the cavity and anode dimensions change and the tuning tends to need a tweak every now and then. Occasionally in the heat of battle the amp would go too far off tune because I forgot to check it; so much that it tripped the grid current alarm and dropped the amp offline, which can be a pain when you're chasing that rare DX on EME or really weak one and suddenly you look up to see no power going out!

The GS35B is a hefty tube as well. Not only in terms of size and weight but also in terms of drive requirements etc. It's relatively low gain so needs about 100 W to drive it to 1 kW+, invariably with an older transceiver this would require some form of intermediate amplifier and hence additional complexity. 100 W from my Icom IC-9100 means that I am at the top end of the drive requirements and was pretty limited to drive the amp any harder without another intermediate amplifier.

The tube amp is also a big bus and weighs in at 3 times the weight of the solid state amplifier that has replaced it and is about 2/3 the size of the replacement.

So, while the tube amplifier is good and a very robust bit of kit and still a credible option for an amplifier it did have some downsides that I didn't like so much. So the hunt was on for a smaller lighter option that could still give me a robust 1 kW out but overcome some of the issues outlined above.

Robust High Power Solid State

Enter Freescale®'s new 50V range of LDMOS transistors in the later part of 2010 and a possible solution to the problem.

In the Q4 2010 issue of *DUBUS* (a specialised bi-lingual English/German VHF-SHF magazine), F1JRD described a 1.25 kW solid state PA using a Freescale® 50 V LDMOS device, the MRFE6VP61K25H.

This 50 V amplifier uses a new device from a whole range of high power LDMOS designs that are extremely easy to build and operate and are extremely hardy, being designed to withstand SWR mismatches of 65:1.

Seeking out some information I was amazed to find videos on YouTube® of these LDMOS devices being tested by running them flat out into open loads, or shorting them with a screwdriver. This really was a true replacement for a tube and one that could be built into a relatively small amplifier. I was definitely hooked!

RFHam™ from France started advertising these amplifiers as a kit and I purchased and built one to gain some experience in the construction

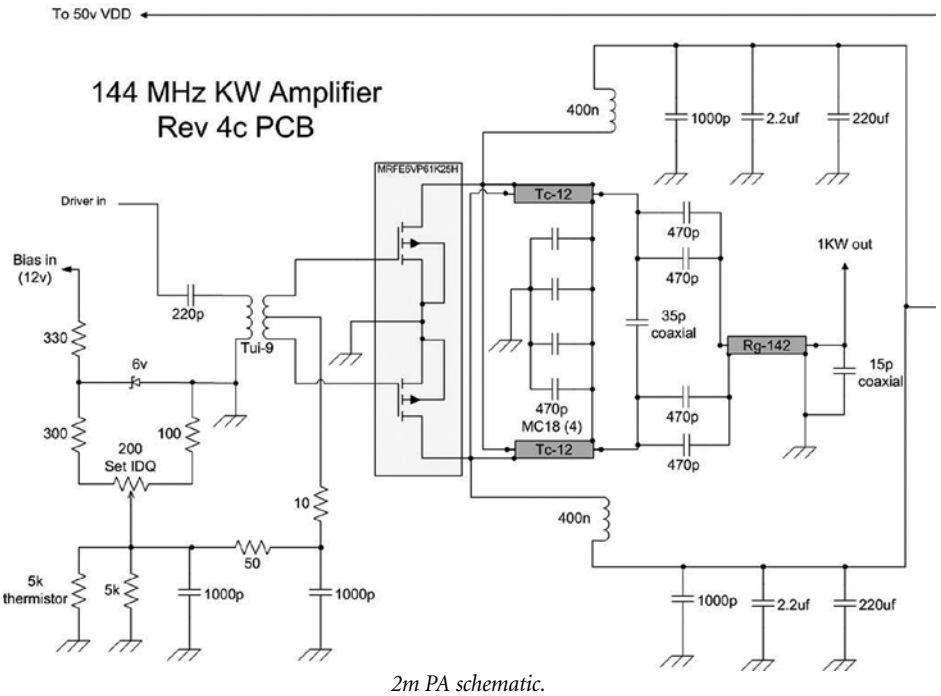
of solid state PA's using these devices.

High power transistor amplifiers are quite different from tube amps but as long as the same ground rules are followed you can easily be successful in building and operating them at the kilowatt level and I don't feel scared putting my hands in the amp box either!

So while designing the rest of the support electronics and a case to house it in, Jim W6PQL burst onto the scene with his modified version of the Freescale® amplifier using the same device but with adjustable bias and an electronic bias compensator circuit that tracks the bias voltage against heat, something the much simpler F1JRD design does not do without some board hacking.

Jim has created further modified designs to cope with the stress that is placed on the ATC ceramic capacitors at 1.2 kW using 100% duty modes such as JT65 and has come up with this latest version to get round these issues. The main problem is that the RF current through these components exceeded the 3-4 A rating of them and in some cases they turned into little fireballs! Jim's design has revised this area using some tough mica capacitors and this is the design I have used in my amplifier as described here.

The Freescale® devices are very robust and compact and Jim's pallets are really not that big when compared to a GS35B's hunk of copper. They are a great price when looking at the $ per Watt figures. At first I can say I was worried about running 1.2 kW out of a single device on such a small footprint but so far I am extremely impressed and after many hours using them on EME they really do deliver. The devices do need some care and attention to mounting and feeding but to be honest the outcome is worthwhile and much easier to handle and operate than a tube amp.



2m PA schematic.

Jim is also very clever in designing sub components for amplifiers that make building and integrating a solid state high power amplifier into your station very easy.

If you have 28 V relays, no problem, there is a 12-28 V driver board available. Latching relays? No problem, Jim has got a board for that too. He also has developed a really superb amplifier control board that has been in constant redesign using experiences from Jim himself, and others, to create a small but extremely useful board which will do most of the work required to operate and monitor a high power LDMOS device. I really recommend a check on Jim's website but be warned (!), it's got some really attractive items in stock; you might want to get the XYL to hide the credit card first!

And Jim has also been busy with other devices in the Freescale® range. He has recently released a set of single and dual device boards for 70 cm using the MRFE6VP5600H device. These 50 V devices are capable of 600 W each at 432 MHz and Jim has created a set of fine amplifiers with both single and dual device boards available. This now means that 1.2 kW out at 432 MHz using solid state is now possible at amateur prices and in kit form. These are a huge leap forward over the tube amplifiers for 432 MHz that were almost the only solutions available at ham prices.

A short time before I wrote this article I was also alerted to a new range of Freescale® devices that will cover 23 and 13 cm so more developments at big power levels at the higher bands will no doubt be forthcoming and Jim is being encouraged to keep us VHF-SHF DX'ers fed with goodies.

RF pallets come from Jim in built-up or kit form and when combined with all the sub modules it means that just about anyone can buy and construct most of the parts needed to create a superb high performance amplifier. It just needs some work to combine all the modules together. And that's what I have done to create a worthy replacement to my tube amplifier with a modern light weight, high performance, amplifier using a fully solid state design.

SSPA design for VHF

So let's look at some of the highlights of these amps and also some tips and pitfalls that I would like to share so you can also avoid them on the route to high power.

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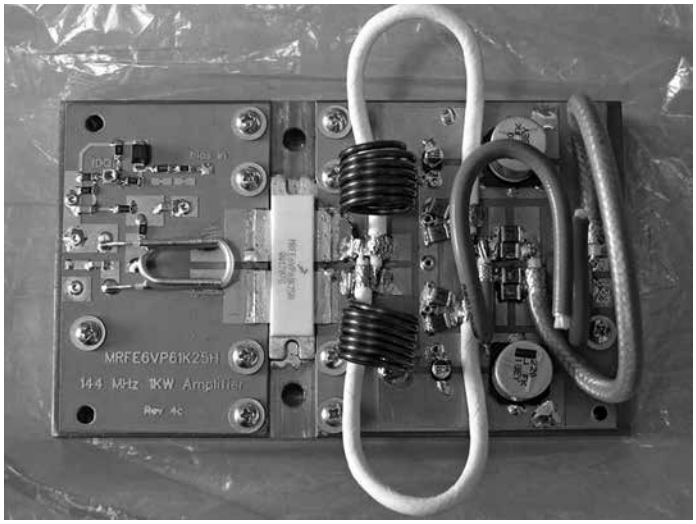
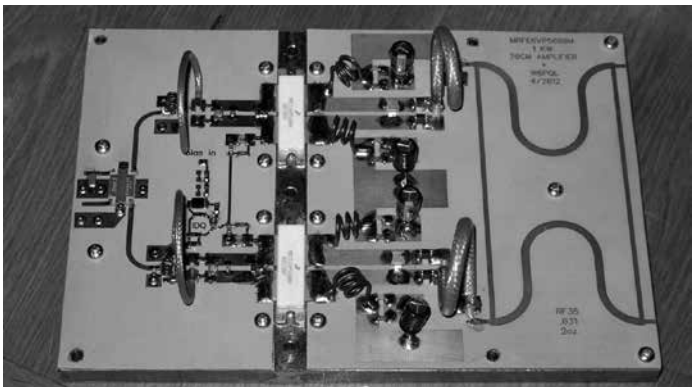


W6PGL's amplifier board.



ZL4PLM's 70 cm PA board.

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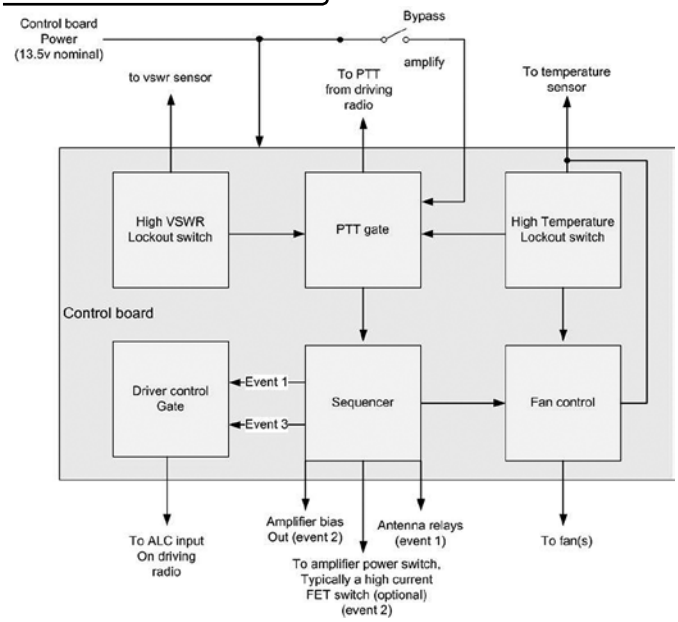


2m amplifier controller circuit.

It's really worth noting that running power at this level requires some attention to detail and even more so if you plan to run EME or Meteor Scatter. One kW RF will find all the weaknesses of your station if you don't construct robustly and think about what you're doing.

It is also important to mention that whilst you may not be using 3.5 kV in these amplifiers, you still need to think about 'where' you are sticking your hands. There is 1 kW+ of RF floating around on that amplifier PCB and 50 V DC at 30A. Shorting either of those out will turn that misplaced screwdriver into a small arc welder so make sure you don't wear anything metal on fingers or wrists while you have your hand in that live amplifier and watch where you stick meter probes, they can easily become very large fuses.

So pay some attention to how you are putting that amp together and you will be successful. Only use high grade components, good relays, high power connectors and quality coax suitable for the job and wire up using the right gauge conductors for the 50 V rails and all will be well with the world.

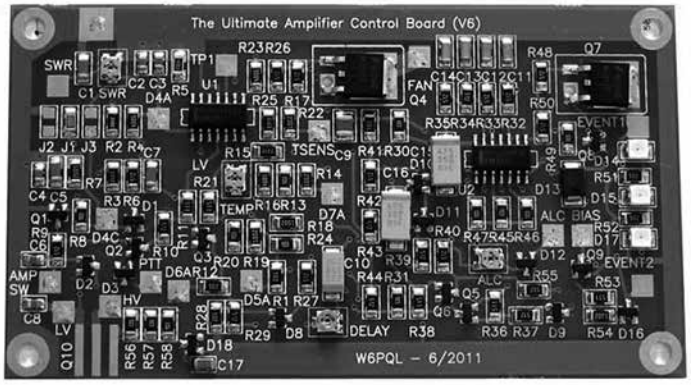
Let's start by looking at the basic RF pallet which forms the heart of this amplifier. The pallet is not too complex. A single active device is mounted on a small 2 piece Teflon PCB using relatively simple construction techniques.

The board mounted components and the active device are mounted on a thick copper heat spreader. This allows for good RF conductivity and grounding and therefore an inherently stable design. It also provides an excellent ground return for the large RF and DC currents passing round the board and, just as importantly, provides a good thermal heat sink and heat spreader for a device, which has a relatively small physical footprint.

The thick copper also acts as a solid mounting which allows the whole RF pallet to be bolted to a hefty heat sink to cool the pallet. The PCB's are mounted to the spreader using a number of 3 mm screws to ensure good contact. The original designs from F1JRD mentions soldering the PCB down to the spreader.

I can confidently say this makes no difference whatsoever and have detected no difference in the performance or efficiency between soldered or screw-mounted versions that I have built. And soldering that PCB down is down right messy!

While on the subject of heat sinking and cooling we should talk about the mounting of these devices onto the heat spreader. My first version which was heat paste/bolted to the copper heat spreader did not survive when running JT65B. It failed in a very spectacular, and also very expensive, bang; blowing the ceramic lid off the device! As you can imagine at this point I was wondering if I had made the right move but I was determined to understand what had happened and why it had failed when others had claimed to have only bolted theirs down with heat paste.



The amplifier controller circuit board.

Following a lead from Jim W6PQL, I soldered my replacement device down on the heat spreader and that has survived plenty of testing and abuse and hours of continual operating EME 1 min periods.

While some decry soldering them down as unnecessary and difficult to achieve or mean a dead device would be difficult to replace, I can only say that in my own personal experience and viewpoint, that soldering them to a copper spreader ensures maximum thermal transmission and means a long and happy life for the device and worry free transmit time for you. My proof is running 1.2 kW for hours on end in 1 minute on / 1 minute off cycles during the *DUBUS* EME digital contest and it just keeps on going. Proof enough for me!

If I ever had to replace a device it's simply a job to cut the device leads off with a sharp hobby blade and unscrew the PCB boards from the heat spreader. The pallet can then be reheated, the dead device removed and a new device put into place. Rebuild is simply a matter of replacing the PCB, screws and resoldering the drain and gate tabs.

Actually soldering the devices to the heat spreader is quite easy. Jim has a video of the operation on his website. All that's required is a thick aluminium plate to act as a thermal capacitor, a good heat source and a few tools and liquid flux. I use the kitchen stove top much to my XYL's amusement, or maybe I misread her and it was disgust! The operation simply needs a small amount of solder placed under the device, apply some liquid flux to the foot of the device, place onto the preheated aluminium and then wait until it absorbs the heat and watch the solder melt. Once the solder flows give the device a little 'shuggle' sideways to spread the solder evenly, do a final alignment check and then remove from the heat. Leave to cool before cutting and eating! Sorry wrong sheet, I mixed up the recipes here (!), but you get the picture. Watch Jim's video and you can see how painless this is.

Jim has done 100's of these devices using this process. I have done way less than that, but Jim has never lost a device yet and nor have I. And I have never since lost a device in JT65 operation. I highly recommend soldering the devices down if you contemplate heavy duty modes, or even for SSB, if you like peace of mind. It's just the right way in my opinion.

Heat sinking the amplifier/spreader combo is also important. As I am using JT65 as my predominant operating mode I use a very large ducted heat sink with 2 x 24 V high capacity fans blowing air through the assembly. Even after hours of long term EME operation the duct exhaust is never more than lukewarm.

The air exits the sink and out of the case from the rear, meaning no hot air circulates inside the cabinet. If you are only using light duty CW or SSB use then you can probably get away with much smaller heat sinking than I do. But I can run key down for 1 minute periods and even after 2 hours on an EME sked the amplifier is not more than hand warm. Using SSB the amp fans will not even turn on in the time I can make a Sporadic Es QSO's and recently I operated some meteor scatter skeds and the amp fans never even turned on! The amp is ready at the flick of a switch, no heaters, no timer and no nashing my teeth while I wait for the amp to heat up when I hear DX suddenly appear on the band during those short Es openings! Hit the amp enable switch and it's ready.

Letters To The Editor

All Letters to the Editor must be signed and include the author's full name, call-sign, (if applicable) and address. Opinions expressed here are those of the author and do not necessarily reflect official NZART policy.

Letters to the Editor: guidelines to contributors

Letters to the Editor should be concerned with Amateur Radio and normally not exceed 400 words. Break-In *follow the guidelines given on page 4-3 of the 2002-2003* Call Book *"Standards of language, and topics best avoided". Accordingly sex, race, religion and politics are not acceptable subject matter.*

Sir

NZART Council rides roughshod over FMTAG

I magine that you've been doing a job well for years and learn that the Board of your organisation are initiating and driving a piece of work in your job description. This all happens without any consultation using so called evidence never put to you for evaluation or action.

Most of us would feel humiliated, disrespected and aggrieved that a group whose job is to provide governance oversight, leadership and direction would do such a thing.

Well by analogy this is exactly what our Council has just done to FMTAG by initiating a review of the 70 cm bandplan. (Motion on-air Council meeting 4/12/12). In a strange twist of cart before the horse they then decide a member of Council should write a paper documenting the issues which led to the decision to conduct a review.

Our constitution defines the role of Council and our rules are clear, it is FMTAG's mandated role to do this work with Council acting in an oversight governance capacity. These rules are not some flexible arrangement changed at the whim of Council to be overridden by a motion passed by Council. The splitting of governance and management arrangements are typical of most (in not all) Board controlled organisations.

When I challenged Council that it is attacking FMTAG's integrity and not complying with our own rules and constitutional governance requirements Vaughan states "*Council is tasked with running NZART. It is Council that set and agreed upon the terms of reference under which FMTAG operates*"

This Council motion does not change the rules or roles of FMTAG it simply rides over the top of those that are in place. Council is placing itself above our rules and every convention of the principles of governance and is acting in place of FMTAG.

FMTAG has achieved the right by RSM to approve the use of amateur frequencies in some critical circumstances. This recognition was hard-won by years of work of a professional standard and such high-handed bypassing of their role risks the goodwill of FMTAG volunteers and our credibility with RSM.

Bypassing FMTAG is serious at every level. Whether this is caused by ignorance or indifference I am not sure although from the response of the President it may be both.

I ask members to raise this matter either directly with their Councillors and/or pass resolutions at Branch level to tell Council to respect our rules and work with the FMTAG committee in a proper governance manner.

For clarity this letter is NOT about whether a review is needed but about the appalling process of initiating and driving it.

Signed E. Linney ZL2TB

Comments and a response to members regarding the letter from Ted Linney ZL2TB

In order to put this matter into perspective, members should be aware that as a result of concerns expressed to individual members of Council, and email discussion within Council, a decision was reached at the on-air Council meeting of 4 December 2012, to conduct a review of the current 70 cm amateur band plan. In particular, Council wants the review to consider if it is still appropriate to have amateur television repeater inputs in the 70 cm band; and to carefully consider the impact of digital television transmissions in the 70 cm band on other users of this band. More detail on this is contained in the request for submissions on the 70 cm ban plan review.

ZL2TB has expressed concern that Council, in taking this step has bypassed the role of the Frequency Management and Technical Advisory Group (FMTAG) and in doing so has attacked their integrity. In email correspondence with Ted ZL2TB in early December, I advised Ted ZL2TB that Council's decision to do this is not intended in any way to be an attack on FMTAG members integrity.

In my email to Ted, I pointed out that Council is tasked with running NZART. It is Council that set and agreed upon the terms of reference under which FMTAG operates. I would refute his claim that the action taken by Council is a "strange twist of cart before horse" – FMTAG is an advisory group to Council and have provided Council with valuable input in the past, and I expect will continue to do so in the future.

As stated above, Council is the body tasked with running NZART. My personal opinion is that in the past, Council has not taken a sufficiently proactive role when issues and concerns such as those which have lead to the decision to conduct a review of the 70 cm band plan have come before Council. The current Council has a number of technically competent people on it which assisted Council in reaching a decision to conduct this review.

Council, in reaching this decision, has simply set in place the framework and some terms of reference for a review of the current 70 cm band plan. FMTAG will be involved with this review and will be part of a small working group being established to consider input from amateurs on what changes if any should be made to the 70 cm band plan. To claim that this risks the goodwill of FMTAG volunteers and our credibility with Radio Spectrum Management is quite incorrect. We currently enjoy a very good relationship with the Ministry of Business, Innovation and Employment's Radio Spectrum Management Group and I do not see the review process initiated by your Council impacting on that.

If, after reading the letter from Ted ZL2TB and my response, you still have concerns about the process used to initiate this review, please take the opportunity to discuss the matter with your local Councillor.

Vaughan Henderson ZL1TGC
President, NZART

Re HV Transmision Lines

I refer to the article on page 12 of the Nov/Dec issue of *Break-In* regarding the use of HV transmission lines to augment radio communication. I joined NZED, Christchurch, in 1975, and on a visit to Hororata Substation I enquired about an assembly of wires and boxes underneath the Hororata-Coleridge 66 kV lines . I was told that this was a radio injection system to allow communication with the linesmen. They parked their truck under the 66 kV lines when working away from the substation, and this allowed communication with the substation operator. I believe the frequency was in the 2-3 MHz range, and the sets used were probably ZC1's or early Tait HF mobiles. I understand the method was once widely used, until the advent of VHF sets and hilltop repeaters. John, ZL2AAU, for many years a Senior Communications Technician with NZED, may be able to provide additional details.

Ross Weir ZL3TFKz

The fans are driven via the amplifier control board and run at full speed while in transmit. On receive if the pallet mounted temperature sensor is warm then the fans stay on until it has cooled to the point set on the controller, where they turn off again. In normal standby mode the fans do not run meaning a quiet amplifier. The only fan I can hear is the small case fan keeping the internal power supply cool.

You can set the temperature trip on Jim's amp controller PCB to vary the on/off values and can be set dependant on your operating style and needs. A small 24 V fan also runs continuously on the rear of the case to provide some cooling during receive for the internal PSU but to also cool the upper surface of the pallet and the matching and output baluns. Not totally necessary but nice to ensure that the coax baluns and low pass filter inductors are kept as cool as possible, as these do get hot during prolonged periods at the 1KW+ level with the high RF current running through them.

Connections to the amplifier module are quite simple and much less complex than a tube amplifier. βi

Receiver Test Reports – what do the numbers mean?; Part 1

by Andrew Barron ZL3DW

Every time one of the major ham radio manufacturers comes out with a new transceiver model many hams are eager to read the reviews on the Sherwood Engineering web site or in the QST, CQ, or RadCom magazines. We are very keen to know how the new toy rates, what new features are included and to get an idea of the value for money. The specifications and pictures are very interesting but they are not the complete story, we need to look at features like the bands available, transmit power, ergonomics, fan noise, dimensions, 2nd receiver, DSP, spectrum scope, build quality and most importantly the price before making a major purchasing decision or adding the new transceiver to the 'lotto list'. But this article deals with the test results that are presented in those technical reviews. What do they mean, why are they important, and how do you interpret them? I have worked in the telecommunications industry for nearly 40 years and I don't know what all of the numbers mean, so this is a learning exercise for me as well.

The ARRL reviews include a handy "key measurements summary" which shows what the lab considers to be the most important test results on sliding red to green scales. Generally the green end represents the best results obtained from any equipment tested to date. Bear this in mind when looking at reviews of older equipment. What was a good result, and shown in green in 1985 may be distinctly mediocre today. Check out <http://www.sherweng.com/table.html> and <http://www.remeeus.eu/hamradio/pa1hr/productreview.htm> for benchmarking tests of many ham transceivers. It is very interesting to see that the cost of the transceiver is not necessarily linked to excellent receiver performance. The very expensive FTDX9000 and IC7800 are beaten on receive performance by the FTDX5000, Elecraft K3, and Kenwood TS590S. But of course those expensive transceivers have many other features such as higher power on transmit and dual receivers. It is also interesting that relatively cheap, software defined receivers (SDR) also offer world class receiver performance.

Most of the emphasis in the lab testing is placed on the receiver performance. This is partly because transmitter parameters are pretty well defined and so long as your transmission is relatively clean and the audio is acceptable there is little perceptible difference in the signal received across the world between a 100W signal from a brand new elite transceiver and a 100W signal from an old boat anchor transceiver. I know some purists spend a lot on hi-fi microphones, filters and equalisers, and you can tell the difference but the gains are more related to how natural your signal sounds and having a chirp free CW signal rather than making it through a pile up for a DXpedition or working a multiplier in a contest. On the other hand good receiver performance makes a big difference. A quiet receiver with great noise filters will really help when you are on the rag chewers or counties net on 80m, selectivity is important if you are an avid contester trying to pull out a weak multiplier operating 500 Hz from a Russian mega station and what happens to the signal you are listening to when your next door neighbour opens up with 1 kW on the same band?

Deciding which of the measurements is the most important factor when comparing receivers depends a lot on how you plan to use your receiver. For hearing weak signals at or near the receiver's noise floor, receiver noise is typically the limiting factor. For the reception of stronger signals under crowded band conditions like a contest, two tone third order dynamic range is the most important number. To assess a receiver's ability to perform well in the presence of a single, strong off-channel signal for example a ham operating in the same suburb, blocking gain compression dynamic range is the dominant factor. These three basic requirements are called receiver sensitivity, receiver selectivity and receiver intermodulation performance.

Let's look at the receiver measurements and work out why they are important. Next issue we will tackle the transmitter tests.

Receiver Sensitivity

Receiver Sensitivity is the ability to listen to weak signals, preferably without undue background noise. Minimum discernible signal (MDS) is a measurement of the sensitivity of the receiver. It is usually measured using a spectrum analyser by increasing a test signal on the receiver frequency until it is 3dB above the noise floor of the receiver. The noise you hear in a receiver that is not connected to an antenna is proportional to the bandwidth of the receiver. So for instance reducing the bandwidth from 500Hz to 50Hz reduces the noise power by 10dB (a 10 times reduction in power). Where possible the ARRL MDS test is carried out with a 500Hz bandwidth setting. Of course when you connect the antenna you hear atmospheric noise and other signals in addition to the noise generated within the receiver. Another common measurement of receiver sensitivity is 'signal to noise ratio' (or for FM receivers SINAD). Signal to noise is the ratio, expressed in dB, of the level of (signal plus noise) with a signal present to the level of (noise) with no signal present. It is measured by increasing the signal into the receiver until the receiver audio output increases by 10dB (10dB S+N/N) so it is normally around 10dB higher than the MDS, which for an HF receiver should be around –120 to –130dBm in a 500Hz bandwidth. SINAD is the ratio of (signal + noise + distortion) to (noise + distortion) and for a VHF or UHF receiver is typically around 12dB for an input to the receiver of 0.25u V (-119dBm).

Receiver Selectivity

Receiver selectivity is the ability to listen to the signal you want to without interference from stronger signals on nearby frequencies. Reciprocal mixing dynamic range (RMDR) is usually measured with a test signal at either 2 kHz or at 20 kHz away from the receive frequency. Reciprocal mixing is noise generated in a superheterodyne receiver when noise from the local oscillator (LO) mixes with strong adjacent signals. All local oscillators generate some noise on each sideband and some LOs produce more noise than others. This sideband noise mixes with the strong adjacent off-channel signal and generates noise at the output of the mixer. The generated noise can degrade a receiver's sensitivity and is most notable when a strong signal is just outside the IF pass-band. RMDR is a 'ham next door test', it measures how large an interfering signal which is offset 2 kHz (or 20 kHz) from your receive frequency needs to be to make your received signal to noise ratio degrade by 3dB. An RMDR of 100dB is good and 140dB is excellent. Direct sampling software defined receivers with no local oscillator are immune to this kind of distortion and so score very high on this test. Often a single adjacent interfering signal has more effect on the wanted receive signal than two strong signals 20 and 40 kHz away (20 kHz spacing) or 2 and 4 kHz away (2 kHz spacing) as measured in the IMD 3rd order tests, so in many cases RMDR is the primary limiting behaviour in a receiver's performance.

Dynamic range is the difference between the weakest signal that a receiver can hear and the strongest signal a receiver can simultaneously accommodate without degradation of the weak signal performance. There are two key dynamic range tests; blocking dynamic range and third order intermodulation distortion.

Blocking dynamic range (BDR) which is also known as blocking gain compression (BGC) or just 'blocking', measures a condition in which a weak signal is blocked or suppressed by a stronger signal on

a nearby frequency. Like RMDR it is measured by injecting an interfering signal at a 2 kHz or 20 kHz offset and is another 'ham next door' test. The test shows when a receiver's sensitivity begins to drop in the presence of strong nearby signals, this is known as 'desense'. The amount of signal that is injected is increased until the wanted signal decreases by 1dB. BDR is usually better in receivers using a single conversion to IF than in multiple conversion receivers. With the pre-amp off, a result of 100dB is good and a result higher than 120dB is excellent. Unless the station you want to work is extremely weak, turning off the pre-amp and adding attenuation to the input can improve the situation by eliminating the desensitisation. This is the reason that transceivers have that ATT button that you never use.

A blocking result that is shown as 'noise limited' in the test report means that the measurement was unable to be measured due to a high noise floor in the receiver. The noise floor may rise when the offending signal is injected, which is the condition measured by RMDR. In situations where the blocking is 'noise limited', the ARRL test lab takes a 1dB increase in noise floor to be equivalent to a desense of 1dB and reports that as the blocking data for the review. Noise limiting is usually worse on the 2 kHz measurement than the 20 kHz measurement which is an indicator that the receiver local oscillator has a high level of phase noise, affecting close in receiver performance, and masking the measurements. 70s and 80s receivers with phase locked loop technology often had very noisy oscillators compared to older VFOs and the new DDS synthesisers. In most cases the local oscillator is used for both receive and transmit, so a noisy local oscillator, as well as affecting the dynamic range measurements and limiting the noise floor of the receiver, will also add broadband noise to your transmit signal.

Intermodulation Performance

Intermodulation is false signals generated inside the receiver by the mixing of strong signals within the receiver bandwidth. IMD dynamic range is the difference between the receiver's noise floor and the level of unwanted signals that cause an undesired signal to appear right on the receive signal. The process of mixing causes the worst IMD product (2A-B) to appear at a frequency spacing equal to the difference in frequency between the two interfering signals. For example if your receiver was tuned to 14,020 kHz and the interfering signals were on 14,040 kHz and 14,060 kHz (20 kHz spacing test), then the second harmonic of the lower frequency 2x 14,040 = 28,080 mixed with the upper frequency 14,060 causes an unwanted signal right on the wanted frequency of 14,020 kHz. Because it is 2x one frequency (2nd order) and 1x the other frequency (1st order) the test is known as a 3rd order intermodulation dynamic range test.

The 2 tone, 3rd order IMD dynamic range measurement, tests how the receiver performs in the presence of multiple strong nearby signals. It is tested with two tones, either 20 kHz or 2 kHz apart, (some labs use 5 kHz spacing). With the pre-amp off IMD numbers greater than 90dB are considered very good.

The two 3rd order IMD tests (2 kHz and 20 kHz) are the key numbers for anyone wanting to work in contest conditions where you can expect many other signals close to your receive frequency.

3rd order intercept (IP3) is another 2 tone test and is related to the IMD test. It also shows how well the receiver performs in the presence of multiple strong nearby signals and gives a good overall indication of how well a receiver performs when receiving a strong signal in the presence of other strong signals. At 20 kHz an IP3 with pre-amp off of +15dBm is OK and above +30dBm is excellent. At 2 kHz an IP3 of above +25dBm is excellent. This explanation is a difficult one so feel free to skip ahead. In a good receiver, with the AGC turned off or disabled, the audio output level should increase linearly as the input signal increases. A 3dB in input signal should give a 3dB increase in audio output. But the audio signal created by the 3rd order IMD intermodulation signal is caused by non linearities in the receiver and it increases at around three times the rate of the input signals. If you plot the audio output level of the wanted signal with increasing input level and also plot the audio output level of the unwanted IMD signal with increasing 2 tone interfering signals the two lines on the chart will cross. The point where they cross is the 3rd order intercept point and the measurement is the input level of the wanted signal in dBm at that crossing point. In a real receiver the AGC acts to reduce the audio level and at high levels the receiver will suffer from blocking gain compression and desense so in the real world you can never reach the intercept point but it can still be plotted by extending the data points gathered at low signal levels before the AGC becomes active.

The ARRL also checks 2nd order intercept (IP2). This is similar to the 3rd order test except neither of the offending frequencies being mixed is a second harmonic. It is a straight A-B test. For example it can act as a check to see if shortwave stations around 6000 kHz and 8020 kHz create interference 'birdies' on the 20 m band, 6000+8020 = 14,020 kHz. An IP2 with pre-amp off of +55 dBm is OK and above +70dBm is excellent. The rate of change for a 2nd order signal is twice that of the wanted signal, so again, if both are plotted on the same chart an intercept point can be estimated.

The last important receiver tests are IF rejection and image rejection. As if the effects of unwanted nearby signals like those contest stations or the ham next door weren't enough of a problem there is also the issue of problems caused by interfering signals that affect frequencies that are intentionally generated within the receiver. The first IF of many HF ham transceivers is higher than maximum receive frequency for example 45 MHz. A strong interfering signal on the 45 MHz IF frequency could possibly be heard within the receivers pass-band. In the IF rejection test a signal on the IF frequency is input to the receiver via the antenna connector. It is increased until a signal appears at the receivers output that is equal to the receiver's noise floor. In the IF rejection test, a signal on the receivers IF frequency is input to the receiver via the antenna connector. The level is increased until a signal appears at the receiver's output that can just be seen above the noise floor. At this point the IF rejection in dB is equal to the input level in dBm. The test is normally done with the receiver tuned to a range of different frequencies, for example the Icom 7600 was tested at 14 and 50 MHz. IF rejection over 70dB is good and over 100dB is very good.

Another problem where external signals might affect frequencies within the receiver is image rejection. One of the characteristics of mixers is that they create a number of frequencies at their output, these include the receive frequency the local oscillator frequency, the sum and difference frequencies and products generated by harmonics of the input signals. Good IF filters and a sensible choice of IF frequency attenuate the effects of most of the unwanted frequencies but some combinations of RF frequencies can produce images in the mixer that are within the IF pass-band. Testing for image rejection is the same as for IF rejection, except the input signal is on the image frequency. Because image frequencies are usually far removed from the tuned receiver frequency image rejection is usually excellent, being 80dB or more. Image rejection over 100 dB is very good. On VHF and UHF bands particularly with dual band hand held receivers which have extremely broad front end filtering the image rejection is often very poor.

OK, you can have a rest for two months now. Part two will discuss the transmitter tests.

References:

Internet sources, ARRL test reports and *QST* August 2004. βi

COMING UP

It is hoped to print the following articles in future issues of *Break-In*. Review and constructional articles are most welcome.

- Transmitting antennas for 500 kHz; Part 1 of 2
- Building a 1.2 kW Solid State PA for 144 MHz; Part 2
- Transmitter Test reports; what do the numbers mean?
- Gettering/conditioning tubes/valves
- Three-way coax switch for under $40
- How to spot ham radio Internet rat

Digital Modes

Murray Greenman ZL1BPU
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This is usually a time of year when not much happens on the radio front; everyone away on holiday, and many of the nets and skeds 'resting' for the duration. I've seen little activity on the bands myself (not that I've looked much, as I've been in holiday mode too), but I gather that recent VHF openings to VK have been better than for many years.

Never mind, there's still plenty of news on the technical front, and plenty here for you to sink your (digital) teeth into.

New Network Analyser

I mentioned a new analyser (the SARK 110) in my last column, and that prompted our regular reader Jon EA2SN to tell me about another two. I quote from his emails:

'You mention the Network Analyzer by EA4FRB. Yes, it is one of his designs. He did also a PSOC-based antenna analyzer, the Sark 100, similar to the NJQRP Antenna Analyst 908[1]. He placed his firmware on the public domain and, a few weeks later, I found a replica kit on the Chinese market! You may find more information on his web page[2]. Melchor is a bright fellow and, this time, he has followed the "fab" path for this complicated kit.'

Jon goes on to mention another kit from India, sold by Fox-Delta[3]. He says:

'I am sure you know the new kit … the AAZ. For a mere US$40 plus shipping you get an already prepped box, PCB and all parts to build one antenna analyzer. It uses an AD9850 DDS to create a signal generator and a return loss bridge to "measure" the antenna. It is USB driven, and the program shows on screen all the gory details, being able to use the cursor to obtain full details of frequency and SWR. The 10 bit A/D on the PIC is more than enough on my humble opinion, but there is also firmware for a 12 bit version with an upgraded PIC.'

This latter device is remarkably well priced. So now you have no excuse when it comes to sorting out your antennas, spoiled for choice!

I also heard from Phil ZL3PAH, with feedback regarding the DS8SAQ VNWA. He comments thus:

'You asked about anyone with a DS8SAQ VNWA. I built one a few years ago when they were only available as kits, and then added on the Codec and USB board. It was not easy to build, especially soldering the DDS chips, but it actually went together well and has given excellent service ever since. I most recently used it to align the filters in two sets of 6 band W3NQN type filters built from the 5B4AGN kits. These were needed for the ZL3X Quake Contesters multi-two HP station we ran in the CQ WW SSB contest recently. I could not have aligned the filters accurately in the available time without this or a spectrum analyser/tracking generator.'

RTL-SDR

You no doubt spotted the recent brief comments by Simon ZL1SWW about using low-cost DVB-T tuners for other purposes[4]. Were you intrigued? Well I certainly was, so I ordered some tuners to play with (they are very cheap). I had also heard about these things from several other sources, which helped push me to explore this new resource. These devices have two main chips, a tuner and a specific base-band COFDM chip (the Realtek RTL2832U), which can 8-bit sample the incoming signals and stream high speed I-Q data at 3MS/s.

Well, I can confirm that the little DVB-T units really are as good as reported: 45 to 1700 MHz reception (depends on the model), any 2 MHz at a time, and with reasonable sensitivity. Despite their apparent simplicity, the frequency stability of these units is fairly good, and the software allows you to trim to a frequency standard. There is excellent software available for narrow and wide FM, AM, SSB, DSB and CW. Because this is an evolving technology, until recently installation and setup has been fraught with difficulty, but now there is a very good auto-installation batch file you can use[5]. As I did, you may also find talking to someone who has experience of these devices helpful when setting up. My thanks go to Ian ZL1AOX, Andrew ZL1WJQ and Harry ZL1BK.

Figure 1. The DVB-T unit with R820T tuner.

There are numerous cheap DVB-T dongles available, but be aware that the software is only for models with the RTL2832U codec chip, since this is the only chip (so far!) that can be put into raw I-Q data streaming mode. The EZCAP model I have is compatible and widely available by mail order. Several tuner chips are supported: the Elonics E4000 being most popular (used in the EZCAP). The newer Rafael R820T tuner has better sensitivity (I bought the 'DVB-T+DAB+FM' model from DX.com). See Figure 1 and note the MCX antenna connector.

A couple of hints; play with the AGC and manual gain controls in the software in order to achieve the best compromise between sensitivity and intermodulation. For weather satellite reception (137 MHz) use NBFM and set the bandwidth to 50 kHz. Use a narrow-band low-noise preamp and circularly polarized antenna for best results.

The two most important software applications for these RTL-SDR dongles are SDR# (SDR 'Sharp')[6] and HDSDR[7]. These programs control the dongle and act as digital receivers and demodulators. Which one you choose depends to some extent on your application: SDR# is best for VHF/UHF, and HDSDR for HF, although for HF use you will need to add an up-converter. I'll cover that subject at another time. There are plenty of videos on the web relating to these little beasties.

SDR# Software

This really is the most amazing SDR (Software Defined Radio) application, especially since it has been developed in such a very short time. In addition to the RTL-SDR modules, it supports RTL-SDR via TCP (network), the Funcube dongle[8], the RFSpace SDR-IQ unit and a Softrock with Si570 synthesizer. This software has NBFM, WFM, AM, USB, LSB, DSB and CW modes. What is more, the bandwidth and filter slope are adjustable, and in NBFM when you change the bandwidth (e.g. for 50 kHz weather satellites), the demodulator also changes to suit. It does a good job of aircraft (AM), amateur repeaters and emergency services (NBFM), and has excellent squelch.

Would you believe, in WFM mode, SDR# not only operates in stereo (with excellent clarity and low noise), it also demodulates, decodes and displays any RDS information transmitted by the station! The RDS station ID is also offered as a name to the Frequency Manager (see later).

At the top right of the display (Figure 2) is a very useful spectrum analyser, with a typical range of 70 dB (adjustable) and a bandwidth of 2 MHz (at 2.048 Megasamples/sec). It is centred on the nominal reception centre frequency, but when you zoom in on a selected signal, it moves towards the centre. You can select signals to listen to by either clicking on the signal, or moving the VFO setting above by scrolling the mouse.

There is a slow (adjustable) waterfall below the spectrum analyser, with matching bandwidth and zoom. I find this very useful for finding intermittently transmitting signals, and also to find any relationship between signals, such as repeater input/output, or linked repeaters.

The panel on the left side controls the demodulator mode, filters, bandwidth, VFO step size, audio gain and spectrum settings. There is also a very useful frequency manager, where you can enter your favourite frequencies, complete with mode, bandwidth and name. These presets are easily recalled, as they can be

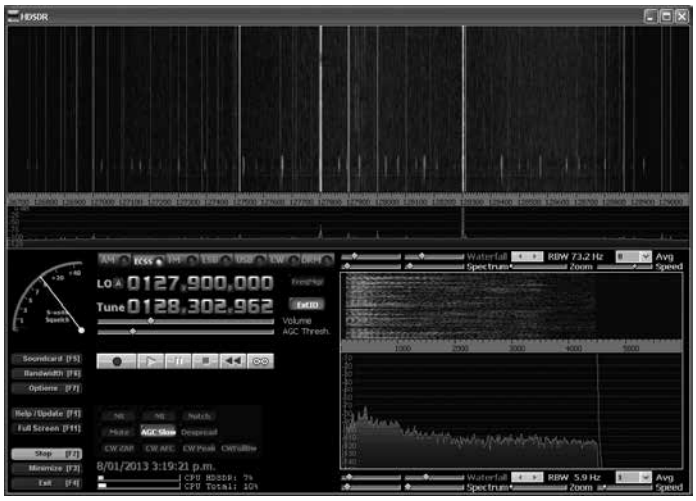

Figure 2. Screen-shot of HDSDR receiving AM.

sorted by application (e.g. Ham, Satellite, Utility).

It is relatively easy to pipe the audio from SDR# to other applications, and for example, I have used it with WXSAT to receive weather satellites, with MIXW to receive VHF packet radio, FLDIGI for conventional digital modes, as well as ARGO for weak signal analysis.

HDSDR

This program by Alberto I2PHD (of ARGO fame) has a long history, stretching back to the original SDRadio. The latest incarnation supports devices that use a family of add-on device-specific programs (Dynamic Link Libraries, or DLLs), and there is one for the RTL-SDR, called EXTIO_RTL. Once you have SDR# installed and working, getting HDSDR going with the RTL-SDR is simply a matter of downloading and installing the HDSDR software, downloading the DLL, and then running the program.

HDSDR is quite different to SDR#, and shows its heritage as a 'real' HF receiver. It has an 'S' meter, visually adjustable filters, and no squelch. It also has an audio notch, excellent noise blanker and noise reduction (best for CW). It has two unusual demodulators – an ECSS synchronous demodulator for AM (gives very clear audio, great for HF broadcast), and a DRM decoder. I've not tried this yet, as I've yet to find a DRM signal to receive.

Funcube

While ten times the price of the RTL-SDR dongles, and about the same size, the Funcube[8] unit is specifically designed for SDR. It covers LF to UHF (150 kHz to 1.9 GHz with a gap 240 – 420 MHz). The Funcube has a low noise preamp, very good filters on the input to reduce intermodulation and break-through, and has much better performance. If you are specifically interested in ham-band VHF/UHF SDR, this is a serious contender.

Weather satellites

I've been receiving these guys on and off for more than 25 years. It used to be a really complex business, requiring you to build everything yourself. There are many ways to receive good pictures from low earth orbit weather satellites, but it can now be done with almost no hardware! In the picture (Figure 4), captured from NOAA18, you can see the North Island on the right, enjoying sunny weather, and the coast of Australia on the left. This is an infra-red image (one of a pair, the other either visible or water-vapour spectrum). There is some noise,

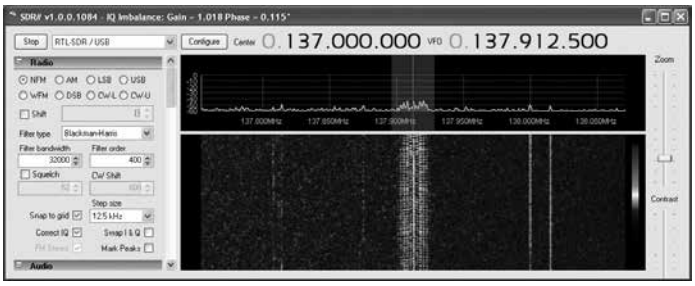

Figure 3. SDR# receiving a weather satellite.

and quite a few fading bands, but a pretty good picture considering that this was received using only a 2 m Slim Jim antenna and a TV dongle! No turnstile or fancy quadrifilar antenna, no low-noise preamp, and no dedicated satellite receiver! I used only the EZYCAP dongle, SDR# as receiver, and WXSAT satellite imaging software. Everything was running on the one computer, an old 3 GHz P2 with Win XP Pro.

Digital VFO Upgrade

I recently added a digital VFO to the old Kenwood TS-130S that I use in the caravan. It's a lovely old rig, but has limited display resolution (100 Hz), fairly fast tuning and a tendency to drift. This type of rig uses a 5.5 to 6.0 MHz VFO on all bands, and combines that with a crystal referenced synthesizer. Adding the digital VFO has really transformed the old radio!

Rather than connect to the external VFO socket, since it has an awkward 8-pin DIN connector and I'd need to provide external switching to control changeover from the internal VFO, I elected to connect to the FIX oscillator (a crystal control option) and use the front panel FIX control to switch. This meant no modifications to the VFO, and very simple connections in the rig, with two thin cables poking out through ventilation holes.

I found switched +9V on the IF board connector to power the VFO, and used the VFO output to drive the crystal oscillator (of course with no crystals fitted). The external VFO is the N3ZI DDS synthesizer with the optional buffer amplifier fitted (there is not enough drive without this). The results are very good; no obvious spuries or other problems, it works on all bands, and I have offset the VFO display by –5.5 MHz in one of its memories so the display is correct to 10 Hz (but does not display MHz). I can still use the internal VFO by releasing the FIX switch, and also the external VFO operates normally for other purposes using the other memories.

If you'd like to try this yourself, ask me for details of the connections. The mod applies to the TS-120S/V and TS-130S/V models, and should be adaptable to other similar rigs.

QRSS software

For most QRSS activity, HF MEPT and LF/MF transmissions are generated using some sort of dedicated transmitter, typically with a crystal oscillator or synthesizer. There are plenty of design options. One advantage of this approach is that you don't need an SSB transmitter, and with some options you don't need to run a computer to control things.

However, there are good reasons to use an SSB transmitter if you have one (flexibility, power level, frequency agility, no construction), but there is little supporting software. I was recently asked for advice by another DX reader, and can recommend two control programs for SSB operation. Con ZL2AFP wrote both programs at my instigation, as nobody else appeared to address this need. The

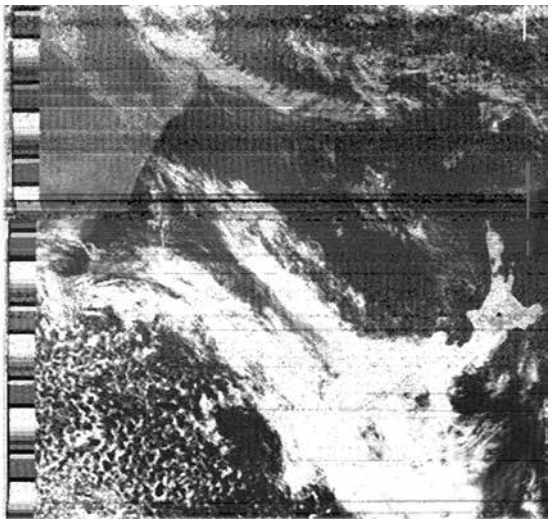

Figure 4. NOAA18 weather satellite image.

continued on page 18

New Members

Name	*City/Town*	*Branch*	*Call-sign*
M Marriott	Christchurch	5	ZL3MYL
R F Elwood	Renwick	22	ZL2BTQ
M O Lawson	Blehneim	22	ZL3MLS
AK McLean	Papakura	65	ZL1AKM
J W Holtum	Christchurch	56	ZL3HN
RGT Bennett	Christchurch	56	ZL3RU
BJ Robbins	Wellington	50	ZL2BD
C H Middleton	Alexandra	61	ZL4JU
N J F Mee	Orere Point	65	ZL1NM
G L Jones	Dunedin	30	ZL4BA
B J Savage	Auckland	3	ZL1TKI
W Redman-White	Hamilton	12	ZL4ET
D Hudson	Christchurch	56	ZL3QI
E J di Toit	Auckland	29	ZL1TET
K J Ulmer	Whangarei	28	ZL1KJU
RL Bradley	Nelson	26	ZL2BOP
RB Jowitt	Papakura	65	ZL1UND
RL Shimmin	Auckland	2	ZL1RY
PE Garth	Gisborne	11	ZL2FH
MS Gilbert	Raglan	12	ZL1VMG
JC Cunningham	Waihola	30	ZL4UJC
IS Newson	Wellington	50	ZL2ULC
DB Good	Auckland	3	ZL1ULN
CA Heath	Upper Hutt	63	ZL2AME
RJ Futter	Wellington	74	ZL2TUD
S W McFarlane	Palmerston North	20	ZL2XB
H M Johnson	Gonville Whanganui	63	ZL2HMJ
EJ Banfield	Rolleston	5	ZL3KJ
J Savage	Auckland	3	ZL1TFW
G Baker	Dannemora Auckland	86	ZL1TOF
TA Gromwood	Maraetai Auckland	21	ZL1TTG
SD Doell	Pukekohe	10	ZL1TZP
RJ Bradman	Auckland	66	ZL1CD
J Thorn	Auckland	2	ZL1PHD
BM Oliver	Auckland	29	ZL1OL
B S Solin	Dunedin	30	ZL4KT
DBJ Hopkins	Hamilton	12	ZL1DBH
K Hunsaker	Wanganui	48	ZL1KAL
PD Eade	Napier	25	ZL2TNZ
T G Wilson	Hastings	15	ZL1BKG
M R Edwards	Palmerston North	20	ZL2AOX
R K Simpson	Dunedin	30	ZL4BX
R W Evans	Invercargill	37	ZL4LX
D O McBeth	Waitara	47	ZL2DG
BSG Keene	Whangarei	28	ZL1TBK
J R Smith	Wellington	50	ZL2ET
C H Stewart	Invercargill	37	ZL4CHS
N J Morrison	Nelson	26	ZL2CID
Michael Foster	Tuakau	12	ZL1TOP
R J C Cox	Hamilton	12	ZL2TFB
A E Adams	Waitara	47	ZL2CVA
S D Palmer	Katikati	50	ZL1TWR
M R Windram	Birkenhead Auckland	29	ZL1UHS
AM Babington	Invercargill	37	ZL4DW
IF Milne	Christchurch	56	ZL3OF
T Sawyers	Carters Beach	62	ZL3TRT
T J Gibbons	Waikino	2	ZL1TEZ
N Chilton	Napier	25	ZL3UFM
T J Wright	Hillsborough Christchurch	5	ZL3TRV
H P Keepa	Porirua	42	ZL2HPK
PG Wright	Christchurch	5	ZL3NK
D Bowers	Taupo	60	ZL1KIW
RJ Iverson	Auckland	3	ZL1TFD
F Fuchs	Lower Hutt	18	ZL2FWF
S Jenkins	Rotorua	33	ZL1UIU
K N France	Waikouaiti	30	ZL4KF
D Rhodes	Akaroa	5	ZL3TFD
M M Edgar	Christchurch	5	ZL3NX
S Earl	Taumarunui	38	ZL1TQK
P Williams	Ngatea	41	ZL1BEB
B McDonald	Timaru	34	ZL3HF
DR Meyers	Rangiora	68	ZL3TOJ
IM Sanson	Chatham Islands	99	ZL7IS
AD Steenson	Porirua	42	ZL2TGI
RG Farley	Nelson	26	ZL4RIK
RD Deuker	Auckland	29	ZL1PP
S Hawken	Auckland	2	ZL3IP
DE Cleland	Hamilton	12	ZL1IY
AR Howan	Porirua	42	ZL2BOW
VE Howan	Porirua	42	ZL2AOU
PTP Collins	Christchurch	56	ZL3PTP
P Twadell	Auckland	2	ZL1UU
DM Hart	Christchurch	5	ZL3DMH
PJ Cornwall	Auckland	29	ZL1BRL
GT Parker	Christchurch	5	ZL3TRL
BJ Dudley	Invercargill	37	ZL4JD
AFS Bowie	Christchurch	56	ZL3AAY
R E Smiley	Wellsford	71	ZL1UIS
R D Donovan	Rolleston	5	ZL3TVK
BA Wright	Lincoln	5	ZL3BAW
KW Windsor	Auckland	29	ZL1OM
N H Browne	Omokoroa Beach	39	ZL1APS
C L Groshinski	Whangarei	28	ZL1SKI

◂ *continued from page 17*

first requires a linear technique, as it can transmit more than one tone at a time. It is based on sending WAV files (so can send any audio), but is intended to transmit files you make using the reverse-FFT program Chirppix by DF6NM. The program uses a timer, so can make 10-minute timed transmissions, which are ideal for grabber stacking. All is explained on the website[9].

There is a second newer application[10] which can be used with non-linear transmitters (class C, D etc), since it sends only one tone at a time. This is a 'WYSIWYG' type of application, as you can click on the screen to set dots which will be transmitted as one of 16 tones, and you can store and recall your favourite patterns. There's no web page for this software, and I've yet to write the help information, but hopefully it will be self-explanatory. You can always send an email to me or to Con ZL2AFP to ask about its use.

Remember, I also have PC control QRSS software for a range of serial-control DDS synthesizers, including the N3ZI and FEI Rubidium devices. Let me know if you are interested.

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Satellite Orbits

Andrew Barron ZL3DW
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The best bets for satellite QSOs this month are; FO-29 VU mode linear transponder, AO-07 UV mode (B) linear transponder, VO-52 UV mode linear transponder and the SO-50 VU mode FM repeater.

Craig Hayhow VK6JJJ, plans to operate as VK0JJJ from the Australian Antarctic Territory station at Mawson as a leisure time activity. He lands on February the 10th, and is planning activate a 6m beacon VK0RTM and test the propagation on that band. The main HF rig is a FlexRadio Flex-5000A coupled to a 400 W amplifier and feeding a terminated sloping triangle antenna for HF and a 5el Yagi for 6 m. He plans to work the amateur satellites on 2 m and 70 cm using a crossed dual-band antenna. He should be workable from ZL via satellite so try him as the satellites come up over Antarctica.

There is a very cool YouTube video describing the new Lockheed Martin $3.5 billion 'space fence' upgrade to the satellite tracking currently performed by NORAD. It is at, <http://www.youtube.com/watch?v=7SJdN90vT04&feature=player_embedded>. In the time lapse photography showing the stars you can see the streaks of low orbit (probably GPS) satellites. The light is reflected sunlight as although it is night time at the camera location, the satellites are still in sunlight. At certain times of the year, when the orbit coincides with nightfall, you can easily see the International Space station on a clear night just after sunset. Out in the country away from the city light pollution you can see the low orbit satellites as well, just like in the video. Look for tiny stars moving in a straight line across the sky. On the big computer display in the video you can see the cloud of low orbit satellites close to the Earth and part of the ring of geostationary satellites much further out. In between are the relatively few Medium Earth Orbit satellites which orbit in sun synchronous and other slower orbits. These are often weather satellites.

OK, it is not about satellites but every ham should watch this video made in the 1950s at the AT&T labs by Dr Shrive who was also the inventor of the phototransistor. <http://techchannel.att.com/play-video.cfm/2011/3/7/AT&T-Archives-Similarities-of-Wave-Behavior>. It shows how waves including radio waves act in a transmission system, like your coax feeder cable, when there are reflections caused by shorts or mismatches. You can actually see the standing wave (SWR). Sounds dull I know, but it isn't! In my opinion the video is excellent, even now, and it is fun too. Why not show it at your next club meeting? You can skip past the modern introduction.

South African cube sat ZACube-1 should be launched by the time you read this. It is rather unusual in having a 20 m beacon on 14.099 MHz.

An Orbital Sciences Corporation Antares rocket will launch three PhoneSat spacecraft into low Earth orbit in 2013 from NASA's Wallops Flight Facility at Wallops Island. The 4-inch "nanosatellites" weigh three pounds each and are dubbed Alexander, Graham, and Bell. Two PhoneSat 1.0 spacecraft use Nexus One smartphone technology from HTC Corp. and Google's Android operating system. The third spacecraft is a beta version of PhoneSat 2.0 built around an updated Samsung Nexus S smartphone running Android OS. PhoneSat 2.0 includes solar panels to enable long-duration missions and a GPS receiver. It also has magnetorquer coils, electromagnets that interact with Earth's magnetic field, along with reaction wheels used to control satellite orientation in space. The three satellites will be "inserted into a spring-loaded dispenser attached to the launch vehicle. They're stacked in there like a toaster," said Jim Cockrell, NASA's PhoneSat 1.0 project manager. The project is designed to make use of commercial electronics technologies as a way to reduce cost. PhoneSat 2.0 uses "Triangular Advanced Solar Cells from Spectrolab (Sylmar, Calif) left over from the manufacturing process for larger solar cells. They cost US$250 for a quantity of 100, have a 27 percent conversion efficiency and are small enough to cover the PhoneSat's surface area. "The PhoneSat project is kind of a technology demonstration effort," said Jasper Wolfe of NASA's Ames Research Center. During the PhoneSat mission, amateur radio operators will be able to download and upload data packets.

A report on the AMSAT-UK web site says that we should see the first flight of a new satellite launch vehicle near the end of 2013. Super Strypi, also known as SPARK (Space-borne Payload Assist Rocket – Kauai), has been developed by Sandia National Laboratories, the University of Hawaii and Aerojet. The rocket is based on an enlarged version of Sandia's Strypi sounding rocket. The all solid fueled vehicle uses a GEM-46 (LEO-46) motor of Delta-2H heritage as first stage. An Orbus-7S (LEO-7) motor acts as second stage and a Star-30BP (Spark-30) or an Orbus-1 (LEO-1) as third stage. It is spin and fin stabilized during first stage burn and has attitude control for the two upper stages. The low cost rocket will be launched from a rail launcher and can put a payload of 250 kg into a 400 km sun-synchronous orbit. Super Strypi will be carrying a swarm of CubeSats, the Edison Demonstration of Smallsat Networks (EDSN). The CubeSats are an unusual size of 10 by 10 by 15 cm (1.5U) and weigh 2 kg. The EDSN swarm will demonstrate distributed, multipoint space weather measurement and are expected to operate for at least 60 days and have an orbit life-time of up to 4 years.

The UK Space Agency's first satellite, has 'booked' its journey into space on a Russian Soyuz-2 rocket. The launch from Baikonur in Kazakhstan is expected to take place in March 2013. UKube-1 has also completed Thermal Vacuum Testing to verify the spacecraft operation in a simulated space environment. UKube-1 will carry a set of AMSAT-UK FUNcube boards to provide a 435/145 MHz linear transponder, an S band transmitter and a 145.915 MHz BPSK telemetry beacon for educational outreach.

NASA has just released two free beautiful interactive e-books, one about the discoveries of the Hubble Space Telescope, and another about the upcoming replacement for the Hubble, the James Webb Space Telescope. Each book features not just text, but galleries of images, videos, and interactive features that help explain the science and technology of each telescope. More details are at: <http://www.oneminuteastronomer.com/7184/free-nasa-ebook/>

As always I am keen to hear about and publish details about your satellite activities, so please drop me an email to <zl3dw@nzart.org.nz> and photos are especially useful. I am also very happy to answer any questions that have you puzzled or will help you get started.

73 *Andrew ZL3DW*

Calling Rotarians who are NZ Amateur Radio Operators

<www.ifroar.org>

The International Fellowship of Rotarians of Amateur Radio is another way in which licenced radio operators can extend their service and fellowship. A New Zealand network is being re-kindled by a few Rotarians who regularly connect with their Australian and European counterparts on 40 m and 20 m. We wish to grow the New Zealand fellowship, develop its character and contribute to Rotary's ideals. We would love to hear from you if you wish to participate.

If you would like to know more, please contact Dr John Moriarty (ZL2JPM) of the Rotary Club of Port Nicholson via <john@moriarty.biz> or 027 4926458.

Longer Wavelengths

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630m amateur band open for business

From the 20th of December 2012, the long-awaited 472-479 kHz international amateur band was added to the allocations for ZL amateur use. Some countries had access to the new band prior to this and many more will gain access in early 2013. As of the date of writing this column, 17 countries now have access to the 630m band. These are Australia, Czech Republic, Denmark, Finland, Germany, Greece, Malta, Monaco, Netherlands, New Zealand, Norway, Philippines, Slovakia, Spain, Sweden, Switzerland, and United Kingdom.

There is already serious activity in Europe and, closer to home, in Australia. The ZL MF interest group was already into the summer recess with no scheduled Thursday evening activity over December and January, but the group reconvened on the 20th to mark this historic occasion. Because of the longer daylight hours, and consequent lack of skywaves, propagation was not marvellous but most signals were at least heard across the country.

The general user radio licence for amateur radio operators has notes 2 and 7 applying to the 630 m band. Note 2 states "These frequencies are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services." This already applies to LF, and most other bands. There are no other licences in New Zealand in the 472-479 kHz band; the nearest are in Western Australia or islands north of Australia, so for ZL there are unlikely to be issues with sharing services. Note 7 states "Radiated power must not exceed 25 watts e.i.r.p." which is the power limit for the temporary 505-515 kHz band. The 505-515 kHz band has a 200 Hz emission limit but there is no such bandwidth restriction for operating within 472-479 kHz. For example, this allows SSB to be transmitted.

The 25 W radiated power limit is also generous by international standards, where 1 or 5 W applies depending upon proximity to countries which claim sensitivity to potential interference with other services, or for other reasons. New Zealand is so far from the rest of the world that such a limit is unnecessary and in fact is almost vital for getting out of our own backyard.

Bob ZL2CA comments on the 20th of December transmissions:

"Five of the six regulars turned up at 8:30 pm on 7166 kHz for an 8:30 pm net on 20th December, followed by 5 minutes each of 630 metre test transmission with similar mode as they previously transmitted on 508.1 kHz. ZL2CA is the only one of the five to have SSB capability from day one, as he uses a modified TS-850 as an LF/MF exciter, which has multimode capability, so an SSB test followed the first round of narrowband tests. Nominated frequencies for 630 m are 472.1 kHz USB for SSB and 473.1 kHz for CW and narrow band modes. This plan means highly resonant antennas have one tuning setting that covers either mode, and for Wellington operators there is least QRM from the Titahi Bay broadcast intermod that has a centre frequency of 477 kHz. Operators in other districts also find these frequencies to be useable, but time will tell what evolves.

Perhaps not unexpected, 630 m tests from 8:30 pm got nil reports for inter-district paths; that is what happens during daylight hours. It was like being "all dressed up but nowhere to go" so the already notified plan was to convene a second net at the darker time of 10:30 pm, and 630 m signals were copied up and down ZL, including SSB from ZL2CA. That was a single flurry of 630 m opening day activity, now the summer holiday resumes and the next scheduled net is the first Thursday in February."

In addition to the regular transmitting participants, there were several listeners. Peter ZL2MS in Hawkes Bay reports reception of Bob's SSB transmissions, and all of the narrow band transmissions from others. Since then I have built a low power SSB exciter (0.4 W output) and Bob and I can probably claim the first SSB QSO on the new band, on the evening of the 3rd of January. At 7 kHz wide the band cannot cope with too many simultaneous SSB transmissions, but the low density of operators in ZL means that the occasional SSB transmission is unlikely to cause any problems, in contrast with countries such as the UK, where congestion is already occurring and adverse comments have been made about wide band modes such as SSB and AM hogging the band.

In an effort to overcome some of the potential congestion, Markus Vester DF6NM has produced a program to slow down normal voice by a factor of three so that it can be squeezed into an 800 Hz band segment [2]. This is a quasi-real time system where like the JT9-1 mode; the procedure is clock-synchronised in fixed one-minute time slots. At the beginning of the minute, the transmitting station speaks for 20 seconds. The slow converted output of the growing audio buffer begins to play immediately, and will go on during the whole minute. On the receive side, fast replay begins at second number 40, and the shrinking buffer will finally be used up by the end of the minute.

This is "hot off the press" as of the 9th of January and I have not tried it myself yet but it sounds like an interesting process, In theory this should result in a 5dB signal-to-noise improvement over normal SSB.

600 metre net

The temporary ZL allocation of 505-515 kHz expires at the end of 2013. MF activity is now likely to concentrate on the more permanent 630 m band. I would be interested to receive comments on whether the 505-515 kHz band should still be used for regular Thursday nets. Should we make the most of it while it lasts, or should we be using 630 m?

Either way, the MF co-ordination net will now meet on 7166 kHz, starting at 8.30pm on the first Thursday in February 2013, and then fortnightly until daylight saving ends when weekly nets will resume. One reason for using 7166 kHz as the coordination net frequency is that, during daylight savings time, the propagation is generally better on 40 m than on 80 m. Furthermore VK's can join in, which they would not be able to do on the old coordination net frequency of 3666 kHz during daylight savings time.

Figure 1. Variometer.

Finite Element Analysis

In the last column I introduced "Finite Element Method Magnetics" (FEMM) program [1], and demonstrated how it can be used to calculate the capacitance of wires with respect to ground. This is useful for determining the capacitance of an antenna so that the amount of inductance required to resonate the antenna system at a particular (low) frequency may be determined.

This time I will show how FEMM can be used to determine the inductance of a coil, in this case a variometer I use to resonate my antenna to our new 630 m band. Although there are standard formulas to calculate the inductance of a coil (eg Wheeler's formula), this is not so straightforward when it comes to a more complex coil such as a variometer. Figure 1 is a photo of the variometer. The coils are wound with thickish Litz wire. There is a movable coil in series with the two halves of the main coil that sits inside the main coil and rotates in a direction perpendicular to the axis of the coil. The interaction of the magnetic flux lines of the outer and inner sections allow a 2:1 variation of the inductance of the coil as a whole. The main coil also has taps for coarse adjustment.

The variometer can be modelled in FEMM using the "axisymmetric". This is applicable to an object that has cylindrical symmetry, such as a coil. In the last column I used

the axisymmetric option to model the capacitance of a vertical wire. Of course with the inner coil at an angle to the axis (such as shown in figure 1) the model is unable to model the variometer correctly, as it is no longer symmetrical about the main axis. But it is nevertheless instructive to model the two extremes, with the inner coil having the same rotational sense as the main outer coil (giving the maximum inductance) and again with the inner coil with the opposite sense, so that the magnetic field cancels some of the field from the outer coil (resulting in minimum inductance). Note that the boundary of the mesh is a semicircle. An "infinite boundary" condition can be formulated for this geometry and it also saves calculation time.

Figure 2 shows the flux lines for the variometer with the inner coil in opposite sense to the main coil. The inductance is 249 µH. Figure 3 shows the flux lines with the inner coil in the same sense as the main coil, resulting in an inductance of 457 µH. These calculated inductances are very similar to the actual measured inductances. The coil windings are modelled as a two-dimensional rectangular cross-section with 31 turns of 1.5 mm diameter Litz wire spaced over 110 mm for each of the outer coils and 10 turns spaced over 25 mm for each end of the inner coil.

The wires can each be modelled individually, but this is a bit tedious to do and the result is the same as the simpler method which converts the number of turns spaced over a certain cross-sectional area of the coil into a current density.

The analysis above is for an air-cored coil, but a coil with a core (iron, ferrite etc) can be modelled just as easily. The inductance of a toroidal coil can also be modelled, although in this case the "planar" option is used. The case of a transformer is a bit more difficult as one generally would like to specify a voltage across the primary of the transformer and the secondary load impedance and obtain the resulting operating currents in the transformer. It is a bit more challenging than determining the inductance of a single winding but it can be done with a Matlab or Octave script that automates a series of runs to iteratively determine a simple transformer's operating point. To fully describe the process is probably beyond the scope of this column and the reader is referred to the FEMM web site which has an example of how this is done. This example can be used as a template for transformers used in low frequency amplifiers.

Erratum

The last column had the voltage 10 to the power of 12 (10^{12}) misprinted as 1012 volts.

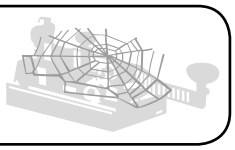
References

[1] <http://www.femm.info/wiki/HomePage>

[2] <http://www.df6nm.bplaced.net/slowvoice/SlowVoice.zip>

Silent Keys

The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.



Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

Gerrard (Gerry) Welford ZL1AWW

With deepest regret Branch 85 wish to inform NZART members of the passing of Gerrard (Gerry) Welford ZL1AWW on 25 November. Gerry was formerly of Manukau Branch 21 but later Branch 85 Mercury Bay after his move to Whitianga several years ago Although troubled with ill health over recent years Gerry still had a great passion for ham radio and was one of those involved in getting Branch 85 out of recess and operational again.

A very strong supporter of Branch 85 and Ham radio in general, always a kind word with plenty of advice for new hams and one of life's true gentlemen he will be sadly missed by Branch 85 and fellow NZART members.

Gerry is survived by his three daughters and many friends.

Murray McGehan ZL1DOM
Secretary Br 85 Mercury Bay

In memoriam; George A McKenzie ZL4JP

As March 2013 approaches a year has passed since George went QRT. No official record has been recorded in *Break-In* of George's contribution to Amateur Radio so Gore Branch decided this record should be placed in *Break-In*.

George was born in 1924 and after attending Primary and Secondary Schools, went on to Teachers Training College, graduating as a Primary School Teacher. It was while teaching Science at Te Tipua School that George became interested in Amateur Radio. He attended a Amateur Radio Course tutored by Neville Checketts ZL40X, and on passing the exam was issued with the call ZL4JP. George became a full member of NZART and Southland Branch 37, latterly a member of Branch 8, Eastern Southland. He was a keen DXer and was well known overseas and in New Zealand.

Being a keen hunter and fisherman in Fiordland, George was always in demand for information about this area. The Fiordland Award was run by George for the Eastern Southland Branch. He operated his QRP radio with great success, keeping in contact with his daughter Heidi (ZL4HAM) at home base. In the evenings, he became a keen member of the Counties Net; where he gained his Counties Award working all Counties.

So George, your many friends will remember you. Branch 8 records all the support you have given to it and your contribution to Amateur Radio in general.

Colin Robertson ZL4KJ

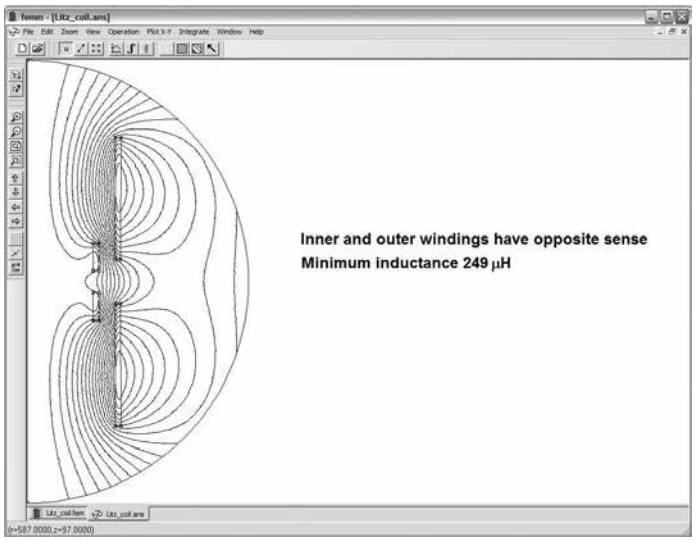


Figure 2. Flux lines for variometer at minimum inductance.

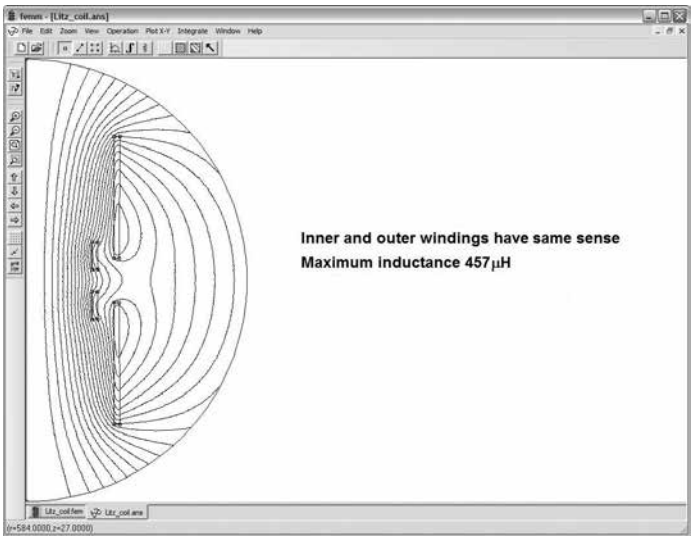


Figure 3. Flux lines for variometer at maximum inductance.

The Morseman

Gary Bold ZL1AN
<morseman@nzart.org.nz>

Transmission lines, SWR, and Morse response time

I read last month's article by Andrew, ZL3DW "SWR myths and mysteries" with interest, since the first advanced Physics course I ever taught was on the theory of transmission lines, and their properties have always fascinated me. Andrew's article reminded me of a question posed to me many years ago:

"When I press the key on my transmitter, the power goes from zero to maximum almost instantly. But reflections travelling back and forth on my transmission line must take some time to settle to a steady state, and while this is happening, the SWR and impedance seen by the transmitter must be changing. I would have thought that this would cause a problem, but it apparently doesn't. What is going on?"

It does seem that this is a problem because all explanations, like Andrew's, emphasize (correctly) that when a commencing CW waveform is "instantly" applied to the line, it can take many reflections from load and source for the line to arrive at a steady-state. But in practical situations, the characteristic times of the line's response and that of the applied waveform are very different.

On a typical 30 m long coaxial transmission line it takes 1-2 µs for the initial wave and each subsequent reflection to traverse the length of the line. Each reflection has progressively lower amplitude because the magnitude of the voltage reflection coefficient, ρ_v, at the antenna end is less than one. Consider an extreme case, where ρ_v = 0.8, corresponding to a line SWR of 9. Even if the magnitude of the reflection coefficient at the source was 1, after 20 reflections from the load the wave amplitude would decrease to about 1% of its initial value, and subsequent reflections will have little effect on changing the input impedance. This will take only 20-40 µs, and on well-matched lines will take much less time than this. You can think of this as the "response time" for the line achieving its steady state.

But the rise and fall times of a properly shaped CW signal are typically 1-5 ms, several hundred to thousands of times longer than this line response time. Thus, even while the keyed waveform is rising, the line reacts fast enough to maintain a "quasi-steady-state" throughout, and the impedance seen by the transmitter/transmatch will be similarly nearly invariant.

So in practice, the input of the transmission line just looks like an impedance, and any SWR bridge you connect to it knows nothing about forward and reflected travelling waves. A typical modern version of the Bruene bridge is shown in figure 1, taken from a document I posted on my website[5]. The right-hand resistor, RL, represents either the transmission line, or the real resistor that you have to place there to calibrate it. The reflections are indeed real, but all you see is the input impedance that they give rise to.

A transmission line calculator

In practice, everything you need to know about your transmission line can be found using a neat Java applet by Kevin, W9CF. Kevin's page[1] tells you how to run it online, or alternately to download it. You need to have the appropriate Java class files to run it, or, if you run it locally, have them stored in the same folder as the program. Figure 2 shows the operating window.

In the boxes at top you can select one of 19 common types of line, and set frequency, length and load impedance. In the graphical window at the bottom you can examine plots of several parameters along the line including voltage, current and the impedance. Output parameters computed include the input impedance, SWR at input and load, and the line loss.

Of course, to make this really useful you have to know what your antenna feedpoint impedance is, but often this is specified by commercial beam manufacturers, or you can estimate it yourself using one of the many antenna modelling programs downloadable from the web. But even without such information, it's interesting to experiment with different lines, lengths and frequencies to see what happens. Kevin has also written a downloadable tee matching applet[2], which I described in a previous column. This is useful to gain practice in tuning a transmatch, when it's necessary to alternately adjust the controls to find minimum SWR.

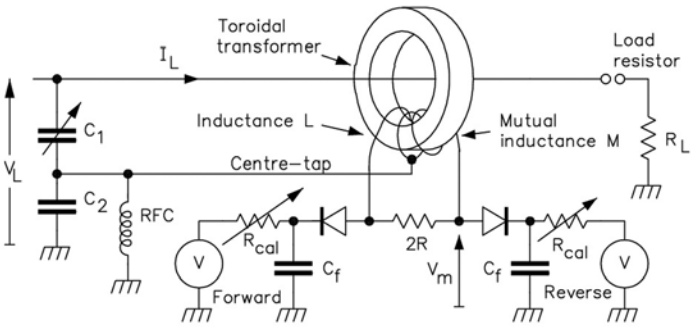


Figure 1. The Bruene SWR bridge.

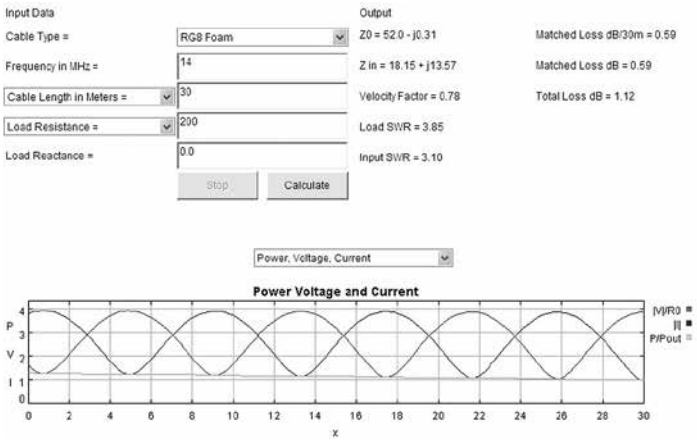


Figure 2. The operating window of W9CF's transmission line applet.

For a rigorous, but very complete and mathematical development of transmission line theory, see a document from Rutgers University[3]. PH Smith's original 1939 paper developing the theory of his famous Smith Chart can also be downloaded[4]

Flamed on the Web

But ho! While looking to see what others had to say on this topic, I found a conversational thread on the web which had the intriguing title "*Ubiquitous Conjugate Thingy*". This stretches over several web pages, and on the last page, according to Mr Google, my paper on the theory of the Bruene SWR bridge[5] and discussion of transmission lines was referenced[6].

When I checked, I found that this thread is mainly an ongoing dispute between Walt Maxwell W2DU, who wrote a series of seven articles for QST called "*Another look at Reflections*", and others who vociferously dispute Walt's version of what happens on a transmission line. Walt was a towering figure in Ham radio, a long-time technical advisor to the ARRL, but who, sadly, died in July of this year, aged 93. Alas, had he not passed away, I would like to have engaged him in discussion concerning his criticism of my paper, which criticism, curiously, neither he nor anybody else ever brought to my attention. Walt was a courteous and gentlemanly correspondent, who always replied politely to his critics, even when they became exasperated with him. They often did, and finally posts on this particular thread became so heated that the moderator closed the discussion down; not the first time this has happened on a Ham forum.

So what did Walt say about me? My paper was drawn to his attention by Tom, WA3KLR (and according to Tom's post, it was downloaded, presumably by interested readers, 75 times.) Walt praised it as a "terrific paper", but then disagreed with most of my conclusions, in particular with my assertion that the output

impedance of a non-linear RF amplifier can't be defined or measured because it's nonlinear. Then, in a later post he also says:

"…when the line is *REALLY* lossy, it does require a complex conjugate load to obtain a perfect match. In this case the voltage reflection coefficient can exceed 1.0." What?

The voltage reflection coefficient is defined (everywhere, by all authorities) as

$\rho_v = (Z_L - Z_o)/(Z_L + Z_o)$,

where Z_L and Z_o are respectively the load and line characteristic impedance. For simplicity, consider the extreme case, where Z_o has a phase angle of -45°, (maximally lossy) and normalize so that $Z_o = 1 - j$, and $Z_L = 1 + j$ (its complex conjugate). Then substituting, we find that $\rho_v = -j$, that is, it has a magnitude of 1, and a phase shift of -90°. This is not, and can never be, greater than 1.

Can a transmission line really have this extreme negative phase angle? Yes, if it's long, and operating at audio frequencies, when the distributed inductance and inter-conductor admittance can be neglected. But then the characteristic impedance is frequency dependent, and higher frequencies have higher phase velocities than lower frequencies. This led to the introduction of "lumped loading" of telephone lines to reduce the resulting distortion – invented by Heaviside, but often wrongly attributed to Pupin.

Only if the phase angle of Z_o could be more negative than -45°, could ρ_v have magnitude greater than one for the conjugate matching situation, but the physics of the line make this impossible. Thus, I can't see what Walt was getting at. Can some reader, with more insight than me, explain?

If the restriction to conjugate matching is relaxed, you can get such values of ρ_v, in particular for some purely reactive loads. Very recently, the use of a three-dimensional Smith chart has been advocated (Google on "3D Smith chart) on which reflection coefficients greater than 1 can be plotted, and which apparently have some physical reality. More on this, maybe, when I understand it.

References from a telegraphy authority

Tom W1TP, is a retired professor of Neuroscience. He is one of the experts I interrogated about the origin of camelback keys in the last column. "How did you become a Morse key expert?" I asked him. He replied:

"I have been a ham since I was 13. I had a very hard time learning Morse Code for the exam. I think I had the impression that Morse was a bit like magic and this led me to become interested in the "magic" of telegraph keys and to start collecting them.

"I started with an American WW-2 surplus J-38 straight key and then tried to buy a Vibroplex bug. But the salesman insisted that I learn to send at least 15 wpm with the straight key before he would sell me a Vibroplex! All this increased my interest in collecting keys and now, 60 years later, I have over 3000 photos and descriptions of telegraph keys in my online telegraph museum[7].

"I have bought, sold, and traded thousands of keys, written a telegraph collectors book and price guide, and created a CD-ROM telegraph key collector's library of telegraph history. I get hundreds of emails every week from people trying to find out about keys. I have put together a simple telegraph kit to encourage kids to learn about the early technology that paved the way for the present internet[8]".

"I have also been collecting, studying, researching and writing about the German Enigma cipher machine for over 20 years. You can find my Enigma book, CD-ROM library, and website at the "enigma" link on my home page. I also love adventure! You can see my story about scuba diving for Enigma machines from another link on that page."

Figure 3. A telegraph sounder constructed as outlined on W1TP's web page.

Tom's "telegraph kit" page gives photos of sets constructed by students from his instructions. No "professional" equipment is required. Even the sounder coil is home-brew, several hundred turns of wire wound around an iron nail, with a bent strip of metal cut from a food-can as the contact. Figure 3 shows a typical product. Constructing such a kit would make an excellent instructional project for a visit of school-children to your local Branch! As well as an introduction to the magic of Morse, it illustrates the use of batteries, the principles of circuits and how electromagnets work.

Tom's website contains a vast amount of other telegraph-related information, including three exceptionally rare movies of Enigma machines in action, filmed by German re-enactors in authentic costume. Links to these are on his "Enigma" page. These are fascinating!

Last month's problem

See figure 4(a), which shows a resonant matching circuit. There is an infinite set of possible values for the three reactances, but in one special case, the magnitude of all three is the same. What is this reactance value? I've re-labelled the components with signed reactances to show this magnitude equality.

Find the impedance of the right-hand series-parallel combination of inductor, capacitor and resistor as a single equivalent impedance, then add this to the remaining capacitor reactance. The series-parallel combination unexpectedly simplifies, after cancellation, to two terms which can be interpreted as the inductance and resistance in series shown in figure (b). The reactances are equal and opposite, and cancel out, leaving only the resistive term. Equating this to Z_{in}, we find that the value of X required for matching is just the square root of Z_{in} and R_L.

This is the simple algorithm I use to find reasonable starting values for tuning a simple tee transmatch. Of course, unless you have a vector impedance meter, in a real situation you don't know what R_L really is, and it probably isn't a pure resistance either, but you can make an estimate, and it's better than nothing. Ron ZL1AI, Ross ZL3TFK, and Robin ZL4IG figured this out analytically. Robin went further, and verified the solution on a Smith chart, after reminding himself how to do this. As I also have to, even though I taught this stuff 45 years ago. Joe VE7BFK, reminded me that I have talked about this problem twice before. Which I did, although I have never asked for the derivation before.

This month's problem

If you examine any old-time DOS executable file, you'll find that it always starts with the two ASCII characters "MZ". What is the significance of this?

References

[1] W9CF's transmission line applet: <http://fermi.la.asu.edu/w9cf/tran/>

continued on page 24

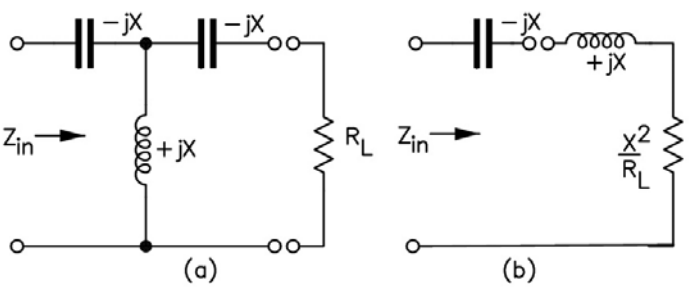


Figure 4. Solution of last month's problem.

Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

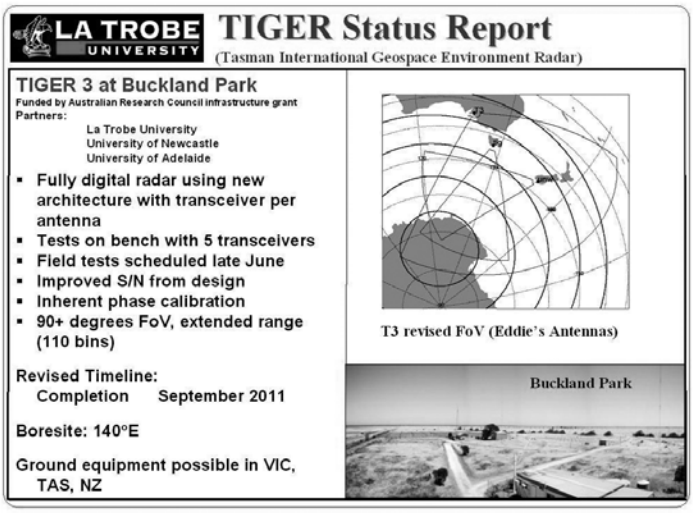
Greetings to all, including Short Wave Listeners and contributors and a very Happy New Year to you all.

Last year, I reported that Radio Free Asia (RFA) was broadcasting on 21 450 between 0300z and 0600z. With some assistance from IARUMS Region 1 Coordinator (Wolf) and the Region 2 Coordinator for the USA ARRL K1ZZ (Dave) during the WRC (World Radio Conference), it appears as though the original transmissions have vanished. I would like to also extent a warm thank you to the NZART Radio Spectrum Officers, who attended the recent WRC for their assistance on this matter too. However, this only leaves the CNR1 Chinese Firedragon firing on all cylinders on 21 450 kHz interspersed with Chinese music from 0430z daily to 0500z, which strangely coincides with 21 540 kHz (which is the correct RFA frequency, which only carries out voice transmissions rather than music transmissions). So this must be a jammer on 21 450 and 21 540 kHz. Normally, I hear the Chinese Firedragon jammer at Signal Strength level 4 or S4 and when the music transmissions commence from 0430z to 0500z the signal ramps up to S9 +10 db. The HFCC and EIBI broadcast schedules confirm that RFA transmissions have moved to 21 540 kHz.

The 7000, 14 000 and 21 000 kHz carrier or N0N, regularly carries on its transmissions interspersed with some very strange signals (or new transmission) mode, which remain a mystery. The transmissions vary up to 6 kHz in bandwidth and are often heard as chirpy signals. So keep reporting these please and any variations.

IARUMS Region 1 also report Russian Teleprinter FSK (Frequency Shift Keying) or F1B transmissions on 15 metres with 50 and 75 Baud and 200, 250, 500 and sometimes with 1000 Hz shifts. Normally, these transmissions are encrypted. And the infamous Russian Airforce Moscow FSK transmissions on 7018 kHz with a 1000 Hz shift are also causing strong 2nd harmonic transmissions on 14 036 kHz with a 2000 Hz shift. The signal quality is apparently very bad and is active every day.

I hope one of this year's resolutions including reporting more intruders on our bands from everyone. Already I have received reports about Russian suspected Pirates on 20 m, Russian encrypted transmissions on 10 112 kHz and the HF Man Pack transmissions across the entire HF spectrum continue to appear on a regular basis. And we appear to have interesting circumstances with the use of Pactor for automatic transmission purposes and related HF radio networks, which has been around for a long time, but with modern developments, these modems can ramp up high data rates. This means increased bandwidth usage during good propagation conditions automatically, without the operator realising (especially within the internationally agreed digital planned allocation), which disheartens other users, using PSK31 or other lower bandwidth modes. Sometimes a great deal of power is being used with these Pactor transmissions, far beyond normal conventional use of modes such as PSK31 or JT65 etc.


LA TROBE UNIVERSITY
TIGER Status Report
(Tasman International Geospace Environment Radar)
TIGER 3 at Buckland Park
Funded by Australian Research Council infrastructure grant
Partners:
La Trobe University
University of Newcastle
University of Adelaide
Fully digital radar using new architecture with transceiver per antenna
Tests on bench with 5 transceivers
Field tests scheduled late June
Improved S/N from design
Inherent phase calibration
90+ degrees FoV, extended range (110 bins)
Revised Timeline:
Completion September 2011
Boresite: 140°E
Ground equipment possible in VIC, TAS, NZ
T3 revised FoV (Eddie's Antennas)
Buckland Park

Intruder System Observer League Table 2012 (up to end of December 2012)

Contributor Name/Call-sign	Number of verified reports
John ZL1GWE	1006
Bob ZL1BAD	373
Stephen ZL1TPH	166
Phillip ZL2TZE	62
Brett ex VR2BG/P	37
Gary ZL2iFB	8
Rex ZL4IV	5
David ZL1DGK	3
Dallas NZRDXL	3
Bill ZL3NB	1
ZL2AAA	1
Others	0

These modems also have the ability to encrypt messages, which goes against our General Users Radio License (GURL) conditions and agreements. In order to decode these signals, one needs a similar Pactor modem, as many of these do not have listen through capabilities built in, makes them virtually impossible to decode, without an extensive range of analysis tools.

The other issue we appear to have is suspected Australian JORN – Over the Horizon Radar (OTHR) due to propagation conditions regularly appearing in the 20 m and 15 m bands, these are signified through the use of a short pip before the main FMCW transmission burst, which often have different rates in terms of Pulses per Second (PPS). Often the bursts are short, but with multiple transmission rates. JORN is a type of OTHR radar technology, which is used by many nations, but this one appears to be occurring from Australian, even though the transmission antenna are pointing towards Indonesia and protecting the Northern Territory coast line. And finally, here is something else to be observed, and confirmed during 2013. Just to cap it all, a new TIGER OTHR from Buckland Park, in Australia has apparently been tested and coming on stream on 10 m and 20 m; called Tiger 3, which coincides with the other two systems in Australia (Bruny Island) and New Zealand (Unwin). You can see and hear Tiger transmissions just outside of the 10 m band on a regular basis for identification purposes.

Thank you for all contributors during 2012 and let's see if we can increase these contributions during 2013 (Hint: HF Man Packs are frequent and numerous and there are other regulars, which can be easily spotted to add to the monthly figures.

Please report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster. Please include if possible, the frequency, time in GMT or UTC, mode, strength and direction (if available). A real bonus would be an audio sample, long enough for identification purposes and any observations you have. If you have any questions, do not hesitate to contact me directly.

John ZL1GWE

◂ *continued from page 23*

[2] W9CF's tee tuner applet: <http://fermi.la.asu.edu/w9cf/tuner/tuner.html>
[3] Rutgers University chapter on line theory <http://www.ece.rutgers.edu/~orfanidi/ewa/ch10.pdf>
[4] P.H. Smith's "Smith Chart" paper. <http://kom.aau.dk/~heb/kurser/NOTER/SMITH2.PDF>
[5] See my web-page at <http://www.qsl.net/zl1an/index.html>
[6] AMfone discussion thread: <http://amfone.net/Amforum/index.php?topic=27502.75>
[7] Website of Tom, W1TP <http://w1tp.com>
[8] Tom's simple telegraph kit. <http://w1tp.com/perbuild.htm >

QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

A Happy New Year to All readers! My thanks go to those members who extended greetings for the Festive Season to the QSL Bureau volunteers; we were most appreciative of your kind thoughts.

On behalf of the NZART, I sincerely thank those members who, from time to time throughout 2012, forwarded a donation or two towards the Bureau costs with their QSL cards; they were greatly appreciated by your Association. The NZPO's action of killing off the 'Economy Mail' option from 1 October 2011 (coupled with higher sun-spot numbers!) resulted in a substantial increase in the QSL Bureau's expenses for the full calendar year of 2012.

The QSL Bureau's annual posting to the less 'popular' Overseas Bureaux resulted in fifty-three envelopes posted at year's-end; several of the less 'popular' bureaux missed out on a posting through the fact that no cards arrived for them.

During the 2012 year the KH8, American Samoa, ZD7, St Helena and ZD8, Ascension Island QSL Bureaux closed their doors! Checking through the ITU listing of QSL Bureaux, I found a total of twenty-six Bureaux have closed their operations since 2000.

Early in December, I picked up a Royal Mail bag from the local Post Office. The thought passed through my mind that the RSGB QSL Bureau was finally getting its act together again: our last posting from them was in August 2010, the first we had received in over three years. This lot arrived after a gap of only twenty-eight months.

Wrong! The Royal Mail Service was handling Italian-sourced mail. Only one parcel was contained in the mail-bag, that being from the Italian QSL Bureau. It contained around 3300 QSL Cards, mainly for 2011 – 2012 contacts. For many years, cards packaged up in small boxes of around 300 cards from this bureau arrived on a very regular basis.

Cards mailed to the central bureau by ZLs nearly dried up through-out October and November but the first week in December saw nearly 6000 QSL cards arrived for distribution. Was there a drop in propagation during late November leaving time for a little QSLing ?

NZART QSL Bureau preliminary figures for the year ending December 31, 2012, indicate that QSL cards received from ZL operators were up around 16% (4,000) whilst incoming DX Cards also were up around four thousand (11%) compared with 2011 figures. The incoming DX cards numbered around eleven thousand more than those received for forwarding overseas; a repeat of the 2011 differential.

NZART QSL Bureau

Recently there was a brief kerfuffle about the NZART QSL Bureau Service providing QSL cards to a non-member. If people had taken time to read the QSL Bureau policy, as has been printed in the Annual *Call Book* for approximately the last thirty years, it might have taken a little of the shock, horror, heat out of some people's surprise re Non-Member use.

After the passing, or retirement of, the late Bill Fouhy, there eventually was put in place a new QSL Bureau regime featuring alterations to the previous distribution methods etc. This new service also was based on the Inward Service being available to all amateurs, NZART Members and Non Members alike, as per the recommendation of the IARU, coupled with minimum costs to the Association along with minimum sorting hassles for the volunteers manning the various sections of the service.

As it states in the rules, 'Any amateur or listener wanting to collect his/her incoming QSL Cards, must supply Self Addressed, Stamped Envelopes (SASEs) to their ZL-Prefix Sub-Bureau sub-manager.' As a result of this requirement, minimal fuss is encountered in sorting cards for distribution to the Association's four ZL Prefix Sub-Bureaus.

The only other alternative would create some chaos through the QSL Manager requiring the Business Manager to produce a new membership list each time there is an addition to it so he was aware of all members when sorting incoming cards as well as having to keep a list of Non-Members entitled to incoming cards by virtue of having paid 25c a card for Bureau distribution of their out-going cards.

Worse would be the many endless hours yearly that would be spent sorting out cards for members from those of non-members. This also would introduce considerable cost to our Association.

The incoming DX QSL Cards *are not owned by this Association* and, as result, would have to be returned to the originating Bureau stamped with reason for the 'return to sender'. Depending on the number of non-members' cards involved, this could add a considerable cost to the Bureau operation as each returned card would add approx 5.5c to the mailing costs we already incur providing this outward QSL Card service to members.

The cost of forwarding non-member cards to the various ZL-Prefix Sub-bureaux amounts to a few pennies as internal mail at $8.00 per 5 kg is cheap in comparison. Cost to the Association for distributing cards to non-members – *NIL* (see above).

Also, with the incoming cards are available to all, if they are not collected within the time limit imposed by the various Sub-Managers, they are ditched, not returned overseas, as by their lack of action, the call-signs holders have indicated their disinterest in the cards in question.

I would have no idea of numbers of non-members involved; it is of no interest at all to us as if there are SASEs supplied, the cards are dispatched; if not, binned!

The only QSL Cards I return to overseas Bureaux are those that are sent here to now-Silent Keys or those who have QSY'd to another country.

The NZART QSL Service does not provide for Branch Postings!! The old service operated on Branch postings only and must have created a massive amount of work having to sort every incoming card into the call-sign holder's Branch.

This was done away with thirty odd years ago when this present service was put in place. Our present-day service places the burden of cost for delivery of each individual Amateur's incoming cards onto that Amateur, not this Association! This also applies to the postings of Amateurs Outgoing cards to the Central Bureau.

If a Sub-manager is requested to provide a Branch posting and is happy to undertake the sorting of cards at his end to facilitate this, that is his prerogative, not a right of any Branch.

Membership proof is only required for outward cards sent to the Central Bureau; Non-members can use this service at a cost of 25c per card.

In addition, all NZART QSL Bureau information is available on Page 3-9 of the 2012 – 2013 NZART *Call Book* and is also obtainable from the Association's Web-site at <www.nzart.org.nz>

Are you acting as a QSL manager for your own foreign call? Are you running a special event station with a special call-sign? Please have the courtesy to notify the QSL Bureau Manager so the volunteer staff know what is happening when they start getting inundated with QSL Cards for what would otherwise be an unknown call-sign. We cannot be expected to be aware of all that is happening in this great world of ours, though we do our best! We do get a lot of cards for station calls that are misread call-signs (especially CW QSOs) and we would not like to return cards for a legitimate station through lack of information on your part.

A number of operators are holding Single Suffix calls with different call-district numbers to that of their regular call-signs. QSL Cards for these single-suffix calls are sorted, along with all other incoming cards, and forwarded to the appropriate Prefix Sub-bureau so, for example, if you are a ZL1 with a ZL/ZM4 single suffix call, you need to supply the ZL4 Sub-bureau with Self Addressed Stamped Envelopes to claim such cards

If you have any questions, queries (QSL managers' addresses, etc) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <zl2rr@xtra.co.nz>

73 Barry ZL2RR

VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

Welcome to another edition of VHF Scene. Here's hoping that you all have had a great Christmas and an enjoyable start to the new year. Despite some interesting weather patterns, we have seen some good events happening in the VHF / UHF spectrum.

6 metre activity

Six has been consistently performing with quite a few spottings from overseas to ZL. 20th December saw DU7/PA0HIP hearing the ZL3SIX beacon at 559 along with many spottings to other 6 m beacons throughout the South Island. December 31st through January 2nd showed many contacts throughout VK back into ZL2 and 3 areas.

Maybe when Auckland gets its Terrestrial Digital TV cutover, we may be able to get the 50.043 beacon back up on the air again. Hopefully we will see more spottings on the ZL1 area.

John ZL2TWS reports on a new 6 m repeater in Climie area. "A quick note to say that Gerry ZL2TDN and I, installed an FM repeater at Mt. Climie this week and it is running well with a lot of users. The frequency is 53.950 MHz with a -1 MHz split. See <http://www.zl2vh.org.nz/repeaters.php> for more info. The power is 60 W less -1 dB duplexer loss and -1 dB feeder loss. The antenna is a base loaded whip with 0 dB omni gain. There have been a lot of stations working it using their HF antenna. There is an anti false trigger mute system on the RX.

Key up the repeater for 2 seconds with your call-sign announcement, and the mute stays in QSO normal mode for up to 20 seconds before going back to delay input. No other tones are needed. #9 however will force the beacon to key up. ZL2VH/R is sent every 20 minutes unless forced to key up. Looking forward to working you guys up north when the conditions lift on 6 m"

2 metre / 70 cm activity

2 metres has been quite exciting from at DX standpoint with a major opening into the ZL3 areas, Bob ZL3TY made major inroads into the VK2 & 4 DX during the 22nd December UTC through 24th December UTC period as well as some on the 29th December. Some WSJT activity was had as well to VK.

The 17th December had a very quick E opening to VK as shown below.

On the 31st December through to 2nd January, it became the North Island's turn to have some favourable conditions. Many ZL1 and 2 stations were active predominantly into VK2 although the scribe was hearing a weak VK4 coming through in the noise but just not enough to sustain a contact. There was some activity in ZL3 areas with some local backscatter contacts as well as a few VK QSOs.

The scribe got down to 3 W (drive level to the amp) and had an easy contact to Ross VK2DVZ with a corresponding 54 at his end. Some stations active in no particular order include, ZL1BK, ZL1AVS, ZL1TBG, ZL1AKW, ZL1AVZ, ZL1TPH, ZL1SWW, ZL1TWR, ZL1UJG, ZL1AVO, ZL2TAL, ZL2CMC, ZL2IP, ZL2ADU to name a few.

There were some 70 cm QSOs also to VK during the same period. ZL1AVS, ZL1TPH, ZL1TBG and others partook in these QSOs. It is interesting to note the same hard core DXers on both sides of the pond coming out of the woodwork but also great to see some new / unheard calls entering the foray.

On 5th January 2013 through 7th January UTC, another opening happened to VK 2,3,4 & 5 with Steve ZL1TPH sitting at Moirs Hill and working into VK5 at 3000 km. Steve ZL1AVS, Brian ZL1AVZ, Harry ZL2ADU and Bob ZL3TY also were having a great time working the DX as well.

Sadly, we lost a useful indicator for 2 m with the shutdown of channel 5a. Enterprising types have decided to use the marine AIS system around 162 MHz as indicators and some of this traffic can be seen on <http://www.marinetraffic.com> Some users that have AIS receivers feed it into their PC which then passes reports on to <marineraffic.com>, this has the advantage that all the reception spots are saved and you can analyse reception patterns later. Bob ZL3TY sent me some interesting info about how he collates his AIS information.

07:27 17-Dec	ZL2ADU	> VK2BCC in GF56DI on 144.1000 SSB 59 > RF60WN @ 2200.9km 280° Very strong
07:20 17-Dec	VK2BCC	> ZL2ADU in RF60WN on 144.1000 SSB 59 > QF56DI @ 2200.9km 114°
07:20 17-Dec	ZL2ADU	> VK2BCC in QF56DI on 144.1000 BCN 59- > RF60WN @ 2200.0km 280°
07:17 17-Dec	VK2ZT	> ZL2ADU in RF60WN on 144.1000 SSB 59 > QF57WF @ 2108.8km 117°
07:50 17-Dec	VK2AMS	> ZL1TPH in RF73IJ on 144.1000 SSB 52 > QF68FC @ 2108.7km 110° home station 100W

Microwaves

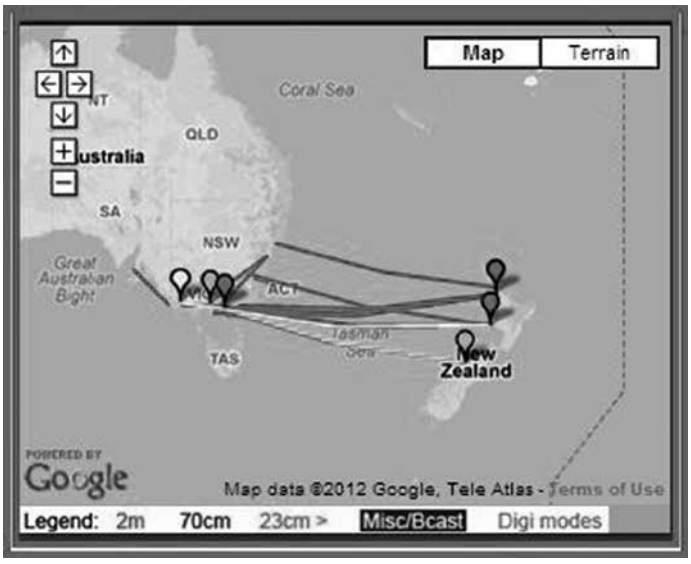
Steve ZL1TPH did several runs up to Cape Reinga to crack some more distances on bands that hadn't been conquered before. Testing was happening between Steve and Ted ZL2IP in Taranaki at 551 km. The primary goal was to crack 2399 and 3400 MHz but 1296 was used as well with a 2 m liaison. Wednesday 2nd January NZDT was the test day and ZL1SWW also played man in the middle at Muriwai.

As an aside, Steve also worked 1296 across to VK2AMS and VK2DVZ. Steve Comments on some of the activity to date from his perspective.

"Day two (this could well be the last day as the band is closed). This morning VK2ZT on 144 MHz; By 10:30 am the band had closed to VK. In the log 144 Sth ZL, ZL1AKW, ZL2IP, ZL1UJG, ZL1SWW, ZL1BK.

In the log 3400 MHz, ZL2IP 551 km (5/5 both ways). In the log 2399 MHz, ZL2IP 551 km (5/5 both ways). In the log 1296 MHz, ZL2IP 551 km (4/1 at my end / he gave me 5/8). In the log ZL1SWW, 3400 MHz circa 320 km (thanks for being there Simon) (5/2 both ways with sharp QSB). A tale on 2399 MHz, Ted only had a half a watt, more likely 400 mW, I could hear his carrier down just. His 2.4 GHz RX had a blown in line preamp. With my 60 W he could just hear me. We waited for a peak and in with the exchange). Summing up, to be heard 551 km with 400 mW confirms good propagation. Ted on 1296 on had 100 mW. So to be heard on 1296 MHz at 551 km with that power indicates very good prop. Back on 3400 or 3.4 GHz with each of us running circa 18 W each, certainly was not hard over but an easy chat once the ovens at each end were warmed up. Of note Ray ZL2TAL (he must be 83 years of age) was up with Ted ZL2IP at the North face of Egmont. The guy is a stayer and legend.

One more comment; it has taken 5 years to work all bands 551 km sth ZL from Cape Reinga, it started in 2009 and now complete 2013,



Small overview of contacts between ZL & VK.

Steve ZL1TPH at Cape Rienga working Ted ZL2IP on 2399.1 / 3400.1 at 551 km.

those bands are 144, 432, 1296, 2399, 3400, 5760 and 10368. Those involved with the many trips to the far north have been, Harry ZL1BK, Simon ZL1SWW, Andrew ZL2ALW and Bob ZL1RS."

Unusual propagation EME; reader comments

Simon ZL4PLM has been reading about Peter ZL4V's interesting comments on his unusual EME experiences on 144 MHz EME. Simon comments "While still only being a relative newcomer to EME being active on the moon for just over a year, I can say that what Peter reports is not an unusual phenomenon it seems as I have observed similar occurrences of this over the past year on maybe 2 or 3 occasions.

My own station consists of 4 x 12 DK7ZB's homebrewed from the design data on the DK7ZB website. These are not small Yagis! They are on 8 m booms and constructed from 20 mm square tube with 10 mm diameter elements and a 12 mm diameter dipole. They are mounted in an H frame at around 25m AGL and mounted in a horizontally polarised orientation. Spacing is 4.5 m horizontally and vertically.

I feed the 4 Yagis with 35 m of LDF4-50 and use a Kuhne 0.3 dB preamp at the mast head.

I run 1 kW at the antennas from a homemade solid state PA using a W6PQL 1.2 kW Freescale module. Driver is an IC9100 and I also run WSJT 9.3.

My own QTH is in West Melton, some 30 km west from the Christchurch CBD. Unlike Peter I have a flat take off to all directions for some distance. The only major obstruction on moonrise is the Port Hills and Sugarloaf, which is to the east, but represents only a small obstruction at this distance and only a couple of degrees in azimuth or elevation.

Westwards on moonset the Alps are my limiting factor but surprisingly I have found them not to be as obstructive as I first thought and indeed on some occasions they are actually helping me! For the most moonrise is out over flat ground across the plains to the ocean and out to sea with little or no obstruction. My elevation here is only 100 m ASL and with the mast at 25 m it can see quite a way.

As Peter suggests the WSJT echo mode is a great way to check out your own echoes but I do find it a bit subjective at times as it seems to get fooled occasionally where I can hear great echoes but it reports low and sometimes I think the echoes are weak but it thinks they are fine! So I tend to use my ears more than software to gauge my own echo strengths.

I was interested in Peter's comments as I was operational the few days he mentions and I remember the QSO with CT1HZE as it was surprising. We had scheduled the QSO some days before knowing that the possibilities of a QSO were slim as we only had a couple of degrees elevation between us and a very short window of around 15 minutes.

As Peter described Joe CT1HZE is close to the antipodal point and it makes for a very short QSO and at low angles. Surprisingly the QSO was very easy and we completed within a few minutes at good signal strength. What was more surprising is that I started calling Joe at -1° elevation and he copied me almost instantly; added to that was Joe copied me at -1.5° too!

This isn't the first time I have had sub horizon QSO's; I have had regular QSO's with KH7Y on Hawaii and we have noticed a few times we were able to make QSOs while the moon was still below my visual horizon. I did mention this to Bob ZL1RS in Kerikeri and he also has made QSO's while the moon is sub-horizon. So this isn't unusual it seems.

I do see a lot of ground gain here too with my antennas, particularly so if the ground is wet from rain or heavy dew. That can enhance low angle signals by as much as 6-8 dB. So I have observed echo tests with horizon enhancement on a number of occasions in similar fashion to Peter.

A few times I have started doing echo tests at about -1° and already see echoes in the range of -22 dB. By -0.5° these can be at -16 dB and 0° elevation can be extremely strong; best echo I have recorded is -7.8 dB. This is an incredible enhancement. My normal range on low degradation figures and geomagnetically quiet days is usually around -12 to -15 dB.

I don't always see this enhancement and like Peter some days it can be there and the next gone. I also observe that by the time the moon is at +5 or so any enhancement is gone.

So what's going on here? It could be that with a sea path there is some surface refraction going on and signals are getting bent over the horizon on moonrise. I do not see the same thing happening on moonset through the Alps but have seen a different type of sub horizon propagation there (knife edge).

I have also noticed that some polarisation rotation takes place very close to the horizon. On moonset for example I will sometimes struggle with Faraday 'locking' me out and presenting 1 way propagation to someone in EU but within the last couple of degrees the polarisation shifts and suddenly I get a big signal both ways.

It's worth remembering that while we send in horizontal polarisation here in NZ, the signals are received in Europe in vertical polarisation due to spatial offset. But that's only when it's perfect and normally there is a good offset so that it comes into Europe more horizontal and allows good signals. One way round this Faraday and polarisation issue is to use cross-polarised Yagis and SDR receivers from both V/H polarities but it is complex and requires yet more aluminium in the air!

If Faraday is not an issue on moonset I can also sometimes see bright pulses on the waterfall display on WSJT. As I am firing into the Alps I can only put this down to knife edge focusing on the alps which is unusual but also very welcome sometimes when I am locked out by Faraday.

So even on moonrise and moonset there is some unusual propagation to be found!

Since December 2011 I have now worked 56 DXCC and over 230 initials worked on 144 MHz EME; best DX so far from myself is a QSO with EA2AGZ in IN91DV at 19 487 km. Incidentally CT1HZE here is 19 311 km.

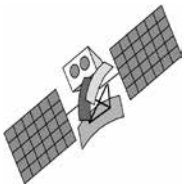
I also use the array for other modes apart from EME.

In August I did some tests with Bob ZL1RS as he was preparing to go to E6. Using his small 4 lightweight Yagis and his amp we did some fun tests during a couple of evenings between our respective QTH's. With his good take off to the south and mine also being relatively clean for more than 60 km we could hear each other pretty much continuously via troposcatter. We did do some EME which was hard due to the large number of meteor pings on the signals! We also tried a variety of different modes from JT65, JT4 and good old CW and SSB. Over the 930 km path we could work practically every mode we tried. Some did not handle the almost continual stream of meteor pings well but clearly the benefits of modes like FSK441 could be seen where practically every period had a train of pings lined up. We enjoyed ourselves during a couple evenings; sadly Bob and his XYL were too ill to travel to E6 for the expedition with Lance W7GJ. Next time Bob

On other news I have also been active during some Saturday and Sunday morning MS tests. On Saturdays

continued on page 28

CALL FOR PAPERS
Technology Convention, Easter, Auckland 2013



Planning for the Technology Convention to be held at the Western Springs Garden Community Hall, Auckland, during March 30th and 31st (Easter) 2013, is well under way.

The programme consists of a series of presentations and demonstrations including:

- The Loop antenna and an experimental tuning tool
- Marine Automatic Identification System used for Propagation Alerts
- Digital ATV – The Wellington and Auckland experience
- Echo Link
- Weaver Method of SSB Generation
- Low Power Low bit rate Communication
- Oscillator Comparisons
- Medical Imaging Technologies
- Digital Mobile Radio Update
- and more!

A social evening in the form of a "Meal and Movie" is being arranged for Saturday Night which will allow partners to join in, as well as a mobile rally with a difference for Sunday Afternoon.

On Monday, a trip to Warkworth to visit the AUT Radio Telescope development has been arranged.

Full weekend registration $50 Plus $25 per person for Saturday Night.

One day Convention Registration $30

For further information go to the web site <www.qsl.net/zl1bq>

Registrations can be made through the Internet via bank account number ASB 12-3020-0473626-00. Account name is: Auckland VHF Group Inc. Include your Name/Call-sign for us to track and put "Easter" in the Reference Field.

Or you can send via post to "Easter Convention" PO Box 10138, Dominion Road, Auckland, 1446.

This is a convention not to miss!

FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

Proposals

None this time.

Final recommendations to NZART Council – December 2012

Branch 69 Kapiti has applied to change the frequency of its 144.650 MHz Digipeater at Mount Field, located at TOPO50 BP32 775757. The proposed transmit and receive frequency is 144.575 MHz, in accordance with the band plan.

Branch 74 Wellington VHF Group has applied for a Digital Amateur TV Repeater at Belmont, located at TOPO50 BQ32 570.40 396.30. RSM has chosen a transmit frequency band of 502 MHz to 510 MHz. An Engineering evaluation, in accordance with RSM PIB38, shows that there will be no interference to other stations.

Update

Subsequent to the December meeting of Council, Radio Spectrum Management (RSM) has granted the, above mentioned, Digital Amateur TV (DATV) Licence. The main features of Licence 236831 are:

- Digital TV Channel 25 (DTV25)
- 502 MHz to 510 MHz
- DVB-T format
- 7.7 MHz emission bandwidth
- 100 W mean effective isotropic radiated power (eirp)
- Horizontal polarisation

The licence is valid for an initial period of 6 months, from 1st January 2013 to 30th June 2013, and permits DATV transmissions for the purpose of testing compatibility with services on the adjacent frequencies and requires the production of a comprehensive report to RSM.

The DTV25 channel is, in effect, the guard band between Digital TV Broadcasts above 510 MHz (DTV26 and above) and Communications services below 502 MHz.

It is hoped that these tests will, once again, demonstrate the engineering capabilities of Radio Amateurs and lead the way to the granting of further DATV licences throughout New Zealand.

Comments and Applications

Please send your comments and suggestions on the above, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://www.nzart.org.nz/fmtag/index.html>

Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>

◂ *continued from page 27*

there is a good turn out from VK and a few stations in ZL who try MS paths across the Tasman. Starr ZL3CU and myself make regular QSO's with VK7MO at 2050 km via meteor scatter. The Orionids was particularly successful with some large bursts heard, sometimes up to 15-20 seconds long. I also tried with Ross VK2DVZ; a difficult path for us through the Alps. Bob ZL3TY manages a regular QSO with the mainlander VK's but here it's a real struggle due to the wall of rock to our west and the low angle meteor reflected signals from VK. On this occasion I did receive some superb bursts from VK2DVZ. It seems there was also some tropo extension off the VK coast which could have been assisting; so something for us east of the Alps to look for!

On Sunday mornings a group of us have been doing some MS to Kevin ZL1UJG. Kevin only has a tiny station compared to the 4 X arrays that the EME boys are using. Kevin runs a 4 ele Yagi in a built up metropolitan area and has been using some relatively low power at one point 25 W and up to 60 W now. He has completed with ZL3TY, ZL3CU and myself which is pretty good going. We would like to see more people active using MS and EME; don't let the fact you have a small station prevent you from making QSO's, there is plenty of opportunity even for small stations to make some log distance QSO's using meteor scatter for example.

Elsewhere I have been busy building new amps for 144 and 432 at the 1 kW level using W6PQL boards and have also acquired a 7.5m dish which I am now busy refurbishing for EME use."

2013 VHF-UHF-SHF Contest Calendar

DX Weekend. All bands 50 MHz and up. (2 and 3 Februrary)

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time. The Contest Rules are available at: <www.vhf.org.nz/VHF-UHF-SHF-ContestRules>. All contest logs should be sent, to arrive within two weeks, to: <zl2wa@clear.net.nz>

Summary

Many thanks go to the contributors who help make this column happen with their input; ZL4PLM, ZL1TPH, ZL3TY and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).

SPAM – Society For The Preservation Of Amplitude Modulation

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I guess this month I have to start with an apology for the "SPAM" column non-appearance last month! I unfortunately suffered a hospital event just before the deadline for copy to be sent to "*Break-In*". (They kept me there for a month). As a result, of course, I missed the deadline. But no matter, I was talking gibberish anyway.

This month there is not a lot to be said, save for a very good article from Alan Manning, ZL1AVL. The bin is now empty! I need new copy urgently:

Hi, Bill, in reply to your call for member's stories of early radio days, my story may not be as exciting as some, but I look back with much nostalgia at my first contact with radio construction.

When I was about 11 years old in 1955 our family went to Wanganui for the May school holidays. We did the usual tourist things of the day and during the visit went "window shopping." I remember there was a radio shop in the main street that had a model train in the window that was activated by placing your hand on a capacitive panel on the window. Fascinated as I was by this magic, there was also a built up Hiker's One radio on display. I nagged my parents to buy it for me and I was very disappointed when they blankly refused, and that threw cold water on the rest of the holiday.

You could imagine my delight when I received, for my birthday the next month a kit of parts for a Hiker's One radio. These parts my Dad had sourced from the local radio shop, included was some plumbers' stick solder, a can of Fluxite paste flux, which I still have some left, and a copper soldering iron that you heated up in the fire. Dad and I spent several happy winter nights building the set, winding the coil etc and when we had finished connected it all up and it worked straight off. I was totally hooked and had that set for several years and would listen every night to many stations from Australia and NZ.

Inevitably the filament of the DL36? failed and I couldn't afford another, but I found you could use a 3D6 which was only a couple of shillings war surplus.

I also converted it to a Hiker's Two and it then ran a speaker which I had made a new cone for out of a filter paper from school.

73 *Alan Manning ZL1AVL*

Ah the days of school! What a lot to remember. Days of homework, Caps. Socks up, bikes to school; about 5 km (nobody pinched them), the "strap" (for younger boys), the "cane" (for bigger boys). Enough of that (It still hurts. Didn't do me any harm though). What about some more reminisces from some of you guys. (Maybe a bit like me though, there are some memories you don't want anyone to know about)!

The next bit is about the ubiquitous "38" set. I acquired a couple recently as the next article demonstrates. I sent a message to someone who has had a lot of experience with "War Surplus" equipment to see what he thought. Read the following:

From: Bill Olsen <mailto:b_olsen@xtra.co.nz>
To: Kelvin Barnsdale
Subject: 38 set stuff
Hello Kelvin,

Best wishes for 2013! Quite some time since we last had a chat.

The reason for this one is about a vibrator supply, see attached photos. I will post it on the SPAM page perhaps. I will probably get to this deadline; I had a "stroke" just at the last one and missed it – that's why there was none in the last "*Break In*". I was kinda busy at the time, they kept me in hospital!

Background

Some months ago I did a favour for a retired farmer who was/is a "technophobe"; he was afraid of technology. It didn't cost me anything apart from a bit of time, to simplify his issues at, no cost to him and he was happy.

We got to talking about this 'n' that and I mentioned I had a fondness for things military. He said "Look, I've got a box of stuff that my son used to play with. It's somewhere in the shed, I'll look it out and you can have it. I'll drop it in sometime". I forgot about it until this week he turned up with a wooden tomato box (remember them?) with 2 x complete 38 sets, with the webbing and all the ancillary bits (as well as the obligatory bird poop). Included is two small 12 V (I think) vibrator supplies, originally with a 5 pin socket, but modified to 4 pin socket to match the 38 set power plug. Dimensions: 8" long, 4" wide & 2" deep. Have you ever seen anything like this? I would hazard a guess that they are NZ made, olive drab in colour with military "arrows" on them. Seem to have operated the 38 sets at some time. I haven't applied power yet, but will soon – after I check them out!

Also the No 3 Carbon mic with only a two connection plug is unusual?

Cheers, *Bill ZL4AE*

And Kelvin's reply –

Lucky you! This is quite a good find, well done. The power supplies are interesting; I have not seen these before. Yes, I suspect they are locally designed power supplies. I wonder if they were made for the 18/48/46/68 set type. I have attached their battery spec, which shows your boxes would fit a WS18.

I have just finished a bout of work on my WS38, trying to find a fault on the transmitter.

Your email reminds me I have a SPAM article 50% finished, I must get on with it!

Happy New Year and I hope you don't get any more medical interludes.

Thanks. Kelvin

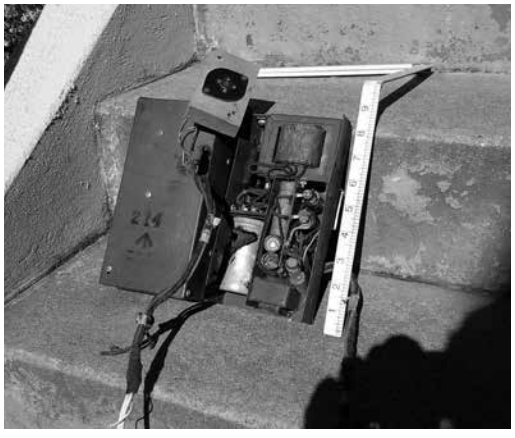
* * * * *

It goes to show that doing a favour for an older guy who doesn't understand a lot of the current technology can bring some unexpected benefits "now and again". Has anyone seen these, or similar, vibrator supplies about? There are some 38 set photos attached which should show what I mean. I haven't included the attachment that Kelvin mentioned in his reply as it is a 5 x page document and wouldn't fit in these pages, but perfectly happy to forward it to anyone who's interested.

Well, that's all for now. We will see what next month brings.

Bill ZL4AE

The 38 sets as received.



Vibrator pack open.

Old Timers' Club

Stephen Hayman ZL1TPH
<zl1tph@nzart.org.nz>

From the Desk of the "Grand Old Man"

Greetings, Firstly I would like to wish you all a Happy New Year and trust that you had an enjoyable festive season. One of the duties of the Grand Old Man is to be seen as the Almoner and Padre for our members with this in mind, it was my pleasing duty to visit Ian Ozier (ZL1AF) at the Palmerston North Hospital after he went QRT and QSY while driving.

If any knows of any of our members who are hospitalised or would like a visit from the Grand Old man please contact me and I will do my utmost to make representation.

My thanks to Roy ZL2KH for sending out reminders for our Monday evening net! All members of OTC should feel free to join in for a quick chat; we would love to have more on board.

Please remember the Conference in Masterton Queens Birthday weekend. (Ivan Horn ZL2ATU, Grand Old Man OTC (ZL)

Old Timers' Club-OTC (ZL)

- To recognise service to Amateur Radio;
- To revive and maintain interests and good fellowship among the older members in the common cause;
- To offer advice and encouragement to newer Amateurs;

The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc.)

Grand Old Man

Ivan Horn ZL2ATU
P.O. Box 7250 Wanganui.
E-Mail <loobie@kol.co.nz>

Secretary/ Treasurer

Barry Stewart ZL2RR
1 Caversham Road,
Westmere,
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Monday Evening SSB Net

Net details: 2030 hr (local time) each Monday on 3.870 MHz LSB.

Sunday morning AM Net

Net details: Sunday morning at 10.30 am on 3.850 MHz.

SSB Net Controllers

Don Dalrymple ZL3SZ
Stuart Watchman ZL2TW
Pete Moore ZL2AUB
Ivan Horn ZL2ATU

AM Net Controller

Doug Alexander ZL2AWF

District Representatives

ZL1: Stephen Miller ZL1FS
ZL2: Stuart Watchman ZL2TW
ZL3: Don Dalrymple ZL3SZ
ZL4: Peter Anderson ZL1LR

New Membership

OTC encourages new members and the only requirement is that you must have held a Ham Licence for 25 years. Application forms are available from the Secretary, Barry Stewart ZL2RR (*Call Book* Address) and a one off fee of $10 applies.

From the Secretary/ Treasurer

I hope the New Year of 2013 is rolling along well for all our members.

New Members

Nil

Silent Keys

Sadly we farewell the following member:

Gerard Welford, ZL1AWW, OTC 892, passed away on Sunday 25 November 2012.

Our sympathy is extended to all their families and friends.

Late last year, I received an enquiry as to whether or not OTC certificates were still being issued. I carried out a manual search and found that the enquirer had reached his sixty years of being a licensed amateur two or three weeks earlier.

As a result, the search function criteria was broadened somewhat and a new computer search of the membership records was carried out resulting in a number of members' names being listed as overdue for certificates! Consequently the following members were issued their overdue certificates (plus an apology!) during the week before Christmas:

Certificates sent out

Fifty Year Certificate

1272, ZL1AVW, Barry Wing, Kerikeri (August 1961) [sic]

Sixty Year Certificates

914, ZL1APH, Clifford Dittmer, Te Aroha (May 1952)
978, ZL3QC, Noel Mullis, Christchurch (June 1952)
667, ZL3RS, Donald Campbell, Christchurch (September 1952)
715, ZL1ARB, Peter Smith, Auckland (September 1952)
744, ZL1ALD, David Smith, Whakatane (November 1952)
609, ZL1BJU, Neville Thompson, Hamilton (November 1952)

I would like to record the passing of my brother, Gerard Heaton Welford (ZL1AWW), on the 25 November 2012 at Whitianga. Gerard was born at Oswestry, Shrupshire, England on the 2 November 1924. The family immigrated to New Zealand in 1928.

Gerard's first schooling would have been at the Kurow Dam site at Kurow, on the Waitaki River. After shifting to Timaru, he attended the Timaru Boy's High School.

In 1940 he joined the Post and Telegraph department, as a Telegram boy and followed this up working as a telephonist until he qualified as telegrapher, using Morse code communications. In 1943 he joined the Royal New Zealand Air force, and after basic training, qualified as a wireless operator, and operated the overseas communications till the end of the war.

After the War he got married to his lovely wife Evelene, and went back to his old job at the Post Office. Gerald had three daughters and lived in Auckland working at various jobs until retiring in 1984.

Ham Radio and photography consumed his retirement years and kept him busy right up till the end. With the help of local hams he was able to keep up our sked's on the National System.

During the last twelve months, he kept up our twice a week sked's on Skype. Gerard is survived by his daughters Jill, Geraldine and Julie and many grand and great grand-children. (73, Arthur Welford, ZL3GE)

OTC news around the Branches

Terry ZL4TAE reports, "A great afternoon at Branch 30 clubrooms on Saturday 8 December 2012 for the annual OTC 'Bun Fight" No disorder was apparent and a great time was had by all after a short welcome speech from Branch President, David Mulder ZL4DK.

Campbell Island crew 1982; Hi; my father asked I send you this photo of the Campbell Island crew that I was part of from November 1982 until November 1983. My father is ZL3HN. I transmitted mostly on 80 m from Campbell during that time as ZL3HI/A. I am in the back row, second from right hand side holding a DSIR 16mm camera. Regards, John.

A great afternoon at Branch 30 clubrooms on Saturday 8th Dec 2012 for the annual OTC meeting. Back row (l-r); Terry Thomas ZL4TAE, Pete Helm ZL4SA, Ron McLeod ZL4FP (obsc), Alan Rackley ZL4CG, Dave Stevenson ZL4SB, Bob ZL4AR, Ross Chapman ZL4RC, Ray Clark ZL4WRC, Mid row; Dave Howell ZL4TAQ, Martin Whitty ZL4LK, Russell Sim ZL4OI, Ernie Scudamore ZL4AH, Charlie ZL1VR, Peter Johnson ZL4LV, Keith Neill ZL4PD. Front row; Anne Watson ZL4WAH, Don Watson ZL4GR, Colin Robertson ZL4KJ (Licensed 1948), Jim Crichton ZL4MP, Dave ZL4OZ' (Photo by Robin Simpson ZL4BX).

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>

Amateur Radio (WIA)
November 2012
p.10 The 'Porta 40' – a direct conversion receiver for portable use
p.15 Surviving the storms
p.17 An FT-817 accessory box
p.21 Analysis of the Off Centre Fed (OCF) dipole (with EZNEC)
p.29 A linear amplifier for 80, 40 and 20 metres (parallel G17BTs)

December 2012
p.10 Adventures with a bistatic chirp and CW radar
p.20 Foundation Corner 21: Navigating the second hand VHF/UHF radio market
p.26 How I built a dummy load from commonly available components, and why I did it!

CQ
November 2012
p.13 Station Remote Control
p.26 CQ Reviews: Elecraft KX3 HF/VHF Transceiver
p.32 An Audio CW Regen Filter combining Aspects of Armstrong's Regenerative Receiver with Reber's Radio Telescope.
p.47 Is Homebrewing Dead ?
p.54 Ham Radio Technology: From Bleeding Edge to Retro

December 2012
p.77 Making Maps

January 2013
p.44 Heathkit VTVM V7, V7A, IM18 Solid-State Modifications
p.52 Simple Signal Generator (7400 NAND gate and 3.58 MHz colour burst crystal)
p.88 Microwave RF Safety: A Technical Conversation

QST
December 2012
p.32 Delta Loop Collinear Antennas
p.35 Super Simple Digital Voice Keyer
p.37 PSK31 Operation on 2 Meter FM
p.39 Product Review: Elecraft KX3 HF and 6 Meter QRP Transceiver
p.45 Vertical or Horizontal HF Antennas – What's best for you?
p.46 What Happens if You Bend or Twist that Yagi?
p.49 Hands-On Radio #119:The Q3Q Balun Redux
P.97 Recapturing the Thrill (Ameco-1) Novice Transmitter

January 2013 Special DIY Issue
p.30 Cheap and easy SDR (using DVB-T dongle)
p.36 Down Periscope! (retractable vertical)
p.39 A Sampling Down Converter for Low Frequency Oscilloscopes
p.44 A Uniquely Tuned 2 Meter Transmitter Hunting Loop
p.46 Build a Legal Limit Bias T that Covers 1.8 to 230 MHz (R.F. plus 3A DC down co-ax)
p.49 For Best Results Consider a Balun in Your Antenna System
p.51 Product Review: ICOM IC-2300H 2 Meter FM Transceiver
p.54 Product Review: LNR Precision FX-2 40/30 Meter QRP CW Transceiver
p.57 Another Delta Loop Idea
p.63 Hands-On Radio #120: Power Polarity Protection
p.65 New PSK-31 Apps for the iPad and iPhone
p.66 Microwave Antenna Measurement: Methods and Equipment
p.91 International Reply Coupons

RadCom
December 2012
p.16 Equipment Review: ACOM 150 1500 W linear (4CX1000A)
p.19 Homebrew: A local oscillator for the direct conversion receiver (Franklin osc/buffer using 3 x MPF1020)
p.27 Start Here: My Tesla coil project – continued
p.34 Design Notes: Sub-harmonic mixers, paralleling MMICs, remote ATU tuning – and a correction
p.36 Data: More reader feedback – and what frequency are you actually on ?
p.42 Noise power ratio (NPR) testing of HF receivers
p.57 Adapting the Heil Pro Set Elite iC (for non-Icom sysytems)
p.58 LF: Simple Class E transmitter (100W)

January 2013 RSGB Centenary Year
p.18 Homebrew: VFO amplifier and BPF for the 40m direct conversion receiver
p.24 Antennas: VHF CFR (Controlled Feeder Radiation) dipoles and more on common mode chokes
p.30 Getting started in ... Repeaters
p.34 Design Notes: Frequency calibration
p.36 Equipment Review: Elecraft KPA 500 linear for HF + 6m
p.42 Folding 2m Yagi
p.46 ATV: Setting audio and video levels
p.65 Start Here: My Tesla coil project – continued
p.68 A virtual laboratory: to help you understand mixers, modulators, product detectors and more (using a downloadable Virtual Lab. spreadsheet for Microsoft Excel.

SPRAT
Winter 2012/13 (# 153)
p.6 40 metre WSPR transmitter (based on ZL2BMI DSB transceiver)
p.10 The 3560 Transceiver (TX is two transistors, 4W. RX is two ICs)
p.12 Experiments with a CMOS Negative Resistance Oscillator
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p.18 A Bigger Toy QRP Transceiver
p.25 A Simple QRP 4 m Transverter

Monday evening on air OTC net

The ZL6OTC "On Air" net details are 2030 hr (local time) each Monday evening on 3.870 MHz LSB and all are welcome to check-in and say hello.

Acknowledgements

Many thanks go to the contributors who help make this column happen with their input: ZL3GE, ZL4TAE, ZL1BDY, ZL2ATU, ZL2RR, ZL2KH and many others.

Summary

The OTC column in *Break-In* is a forum for members to publish a letter, or an article. OTC readers, along with association members, will all enjoy reading and hearing about other radio amateurs experiences, both past and current.

Contributions can be technical, an account of first involvement with early amateur radio, nostalgia, along with vintage radio which all provides an invaluable source of information on the history of their hobby.

The "Old Timers' Club" was essentially a social organisation, and that is still current today.

Articles relating to all aspects of OTC, are most welcome, and to be addressed to: Stephen Hayman, ZL1TPH; Postal address, 68 Kath Hopper Drive, Orewa, 0931 or via email to <zl1tph@nzart.org.nz> We also accept large picture files sent via email and will transcribe hand written letters to text.

73 *Stephen ZL1TPH*

Campbell Island crew 1982.

Contributions to Break-In

Break-In is a forum for NZART member's amateur radio projects, experiences, opinions and news. Your contributions and feedback is welcomed. Contact the Editor John Walker ZL3IB at <john.zl3ib@ihug.co.nz>

AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi, Everyone. We trust that you have all returned from the holidays totally refreshed and recharged and ready for the year ahead. In this issue we take an opportunity to look back to activities of a much earlier time. This particular item was recently found amongst some other papers we had and is fortunate in that no other fresh material has been forwarded in time. That aside, it is interesting to compare today's modern facilities with those of yesteryear.

Search and Rescue 40's Style

The following story appeared in *Break-In* in February 1947 and tells of a mountaineering tragedy, at New Year, in the hills behind Glen-Lyon Station in the Hopkins River Valley above Lake Ohau. It was written by (the now late) Jim McKim ZL3LL, a very highly respected man of his day in both amateur radio and Search & Rescue.

There have been many changes in the past 66 years, not the least of which are that the holders of the call-signs listed here are no longer with us. Today there is good road access to the station round the north side of the lake but this would not have been the case back then. Even the township of Twizel would not have been built, and what roads did exist would have all been rough shingle.

For our younger readers some explanations: Measurements have been converted to metric, the Army Quad was a military ¾ ton 4x4 (either a Ford V8 or a Chev.), PWD = Public Works Dept. (a Government Department responsible for roads, bridges and construction), the radios were ex-army ZC1's (with waterproof covers) with (sectioned) vertical whip antennas, and the aircraft most likely a DH82 Tiger Moth. The Cletrac was a small crawler tractor.

"*Glen-Lyon*" and Beyond

Leaving Timaru at 1200 hours we headed for exactly what we knew not; or at least we knew where we were going but had absolutely no idea of the nature of the country. The objective; Glen Lyon Station (and beyond). It was originally intended that the party (comprising Sgt Spencer, Constables Preston and Peggie of the Timaru Police, and amateurs ZL3HC, JO and LL) should travel up in a private car but when the police saw the pile of gear that was to go, an army truck of the Quad variety was commandeered and this was the best thing that could have possibly happened in light of later developments. After leaving the Pukaki road the driver was given strict instructions to take it easy as possible over the rough ground which seemed enough to jar the works out of even the most rigidly constructed of radio gear. But after what the equipment went through later, this shaking up could be classed as a mere vibration.

The station was reached at 1800 hours that night 2/1/47 and a short stop was made to drop ZL3HC and Constable Peggie at the homestead with one unit. Once the station was a few hundred metres behind, the fun started. The quad started well by sinking to the 'diffy' and looked like a permanent fixture, but after some time and solid pushing by all members of the party, we were on our way again. But for how long? Into the mud we went again. But fortunately by this time a Bulldozer driven by one of the PWD employees was up with us and we were to be his constant companion for the next few days. His name was John Devlin but at once nicknamed "Irish". And hats off to the "Irish" because without him we would have never have got to the top in a month of Sundays. Our time for the first 8 km was six hours and at midnight we found a fairly decent patch of matagauri and decided that this would be our boudoir for the night.

Grub was the caper and while the police fixed that part up, the Hams got on the air. Contact was made at 0020 and then to bed until the hour of 0400. Then on with the merry dance. Once or twice "Irish" had to cut a way through for us and tow us through the slush that he had made but all went well until our towing bar decided that it had had enough and gave up the ghost. We hung it up in a conspicuous place and moved on a bit lighter. About 11 km out from the station we met the manager (Mr. Chisholm) coming down from the scene of the accident with a request for urgent drugs. It was fortunate that his arrival coincided with the half-hourly check that we had with the base station and the message was handled almost immediately. I think that the most welcome sight that we saw that day was the plane roaring up the valley at a height of about 10 m. We knew what was aboard and how badly needed and felt at that stage even if our services were not required again we had justified our inclusion in the scheme. The radio in this case had probably saved about two to three hours. By the time we had reached the top hut all available towing places on the front of our quad had been forcibly removed by "Irish" and he had resorted to pushing us along with his cutting blade. This was all right except for times the truck was lifted some metres off the ground in the blade and then slipped out and dropped with a wallop to the ground.

When we reached the upper part of the valley we swam a couple of times and it is perhaps a good thing that the river was not too wide as we sank slowly each time as the water came up through the holes in the bottom of the truck. On one occasion both units were underwater and they lived up to their reputation and still carried on. We finally arrived at the scene of the accident at about 1530 on 3/1/47, not bad going really, it only took about sixteen hours to cover the 40 odd km up. Up went the 11 m high vertical aerial as we had only been using four metres of it while coming up as we were operating mobile all the way and it would have been impossible to use any longer length due to the swing it got at times. As it was the tip of the whip was within centimetres of the ground on many occasions. Quite a pile of messages of all sorts were handled and then round we turned for the return journey as all the injured had been brought down from above and our services were no longer required at the top.

We finally pulled in at the hut 15 km from the top for the night about 2100 hours. But no sleep for the radio personnel as a tractor had set out from the station with fuel supplies and was overdue at our location. However, he turned up at 0200 on 4/1/47 and a few hours of sleep was enjoyed.

When the next morning dawned, the injured personnel were on their way to Timaru and it looked as if the show was over. But the authorities decided that it would be just as well if they were satisfied themselves that all the rescue parties were clear of the valley. So 3JO set up shop in the four wheeler that had brought up the fuel the night before and was taken in tow by the Cletrac tractor and set out on his mission. We claim that this was the first time that a Ham has ever operated portable in a dray and from what we heard afterwards, it is not to be recommended.

Our great little network was now three stations strong, and as 3JO could not copy the base station due to the tractor generator hash, 3LL at the top hut acted as a relay point as well and was not called upon to bear much discomfort however, as they met the last of the parties coming back down after about 5 km had been covered. So back they came and the convoy formed up for the trip back. Never was a more oddly assorted outfit ever seen, it was more like the old Yukon gold rushes as portrayed by the movies, only a little more modern. First was the Cletrac with its load of people behind on the ancient dray, then follows the signal van or at least what was left of it, then our old co-partner in crime, "Irish" with his little toy. The journey was a little slower than the trip up as we were stopping every so often to let the Cletrac catch up, but eventually the homestead hove in sight. And never was a sight more welcome… the show was over. A hot bath, and then to bed!

Technical Points

A few more or less technical details. At the base station the full ZC1 vertical antenna was used at all times and contact was established on two occasions with 3KX in Timaru. While operating mobile the four whip sections were used, and although at night when we were stopped and the full antenna was erected, the increase in signal strength was very little. The total distance operated over was in the vicinity of 40 km, and it would seem that the ZC1 operating into 4 m of vertical with the truck chassis as a counterpoise should do quite a good job for this distance. The input into this system was in the vicinity

of 8 W AM (at times).

The scene of the operation was in a winding valley, and we were operating under the shadow of the hills at all times. The results obtained may have been influenced to some extent by the reflection off the hills.

It is considered that the AREC frequency is absolutely unworkable down here due to excessive splashing over of a couple of stations on approx. 3505 kHz and we feel the only way to give AREC work a decent break is to press the P & T Dept. for a separate AREC band. The same trouble was experienced with stations on the high end of the band. And as ZC1's seem to be the mainstay of AREC work at this time, this is going to be the story in all cases. We would like to place on record our thanks to the Timaru Omnibus Garage, and to Jones Motors, Fairlie, for the prompt way they both supplied us with accumulators. And last, but not least, to John Devlin, for the way he got us there with his bulldozer. We are sorry we have no photos, but even had we taken a camera, we just wouldn't have had time to use it.

A word of warning to all AREC stations. If you are out on a job and have aircraft co-operating, and you are using a vertical antenna of any sort, put either a red, yellow or orange pendant on the top, as we nearly lost our stick at one time. The ZC1 fishpole is invisible from the air, and a danger to low-flying aircraft.

The units took a terrific thrashing, and stood up exceedingly well. No replacements were needed, and it is safe to say that they will never be called upon to take a worse hiding anywhere within New Zealand. If you are mobile, stop at least every two hours and make sure the whip antenna is firmly joined. We learned the hard way. And you haven't heard QRM till you hit those hills. (…or today's built-up areas. Hi.)

Activity Briefs

(A selection from Nov/Dec)

6/11/2012. Westland Branch 49. SAR. Explorer Hut, Mikonui River, Ross. 50yr old male tramper 12 days overdue, base set up at Hokitika Fire Station, comms ESB57. After 4 days of searching by air, ground, dogs including cadaver dogs and white water kayak teams, no trace found. Search called off, most probable scenario, fallen while crossing river and been washed out to sea.

6/11/2012. New Plymouth Branch 27. SAR. Vogeltown, New Plymouth Depressed male missing since mid-afternoon, had gone for a walk and not returned. Body found the next day.

6/11/2012. Southland Branch 37. Sports & Training. Bluff Hill, Invercargill. Southland AREC has been asked to assist the Mountain Bike Club with communications at an event in Jan 2013. The section tested radio coverage around the proposed bike tracks around Bluff Hill using the CD fixed Repeater and DOC20 Portable Repeater.

13/11/2012. Otago Branch 30. SAR Training. Logan Park, Dunedin. Provide a training session on radio for the NZ Land SAR Dunedin Group. The session involved using various SAR VHF and HF channels to pass messages and provided an opportunity to train with the various equipment and channels available to the group.

21/11/2012. Wairarapa Branch 46. SAR. Tararua Ranges. An ill-prepared Chilean tourist who got lost while tramping in Mt Holdsworth. He walked to the summit of Mt Holdsworth on Wednesday but, coming back via the East Holdsworth Track in misty conditions, he lost the path and ended up nearly 3 km off track. He followed the Holdsworth Stream in hope it would lead him out, but soon realised he was lost and texted a friend in Auckland, who alerted police. LandSAR sent in five rescue teams to search for him, with a Helicopter to search by air, but they were hindered by foggy conditions and did not find him until the next morning at McGregor Falls.

2/11/2012. New Plymouth Branch 27. SAR. Westown, New Plymouth. Male missing, possibly taken overdose of medication. Male located semi-conscious.

23/11/2012. Franklin Branch 10. Sports & Training. Manukau. Christmas Parade Crowd control.

24/11/2012. Marton Branch 23. SAR. Wanganui City. Urban SAR for 76 YO Male, having not returned to residential home by mid-afternoon from daily walk. Area for walk was Virginia Lake walkway. Immediate response requested. MP found fit and well by local Taxi company, some 10 km from LKP, found at 0015 hr, back home by 0200 hr.

29/11/2012. Southland Branch 37. SAR. South Invercargill. Missing elderly woman from Peace Haven rest home. (Wanda Track User) Started search by using Wanda Track receiver. Shortly later she was reported found at the Blue Star Taxi depot. It was established the pendant was turned off, hence why she couldn't be tracked. Woman was then returned to her home safe and well with pendant turned back on.

30/11/2012. New Plymouth Branch 27. SAR. Syme Hut, Mt Egmont. PLB gone off in vicinity of Syme Hut. 1 male tramper unwell. Male located in hut, uninjured but unwell.

2/12/2012. New Plymouth Branch 27. SAR. Curtis Falls Track, Mt Egmont. Two trampers activated PLB. 1 tramper had slipped, possible dislocated shoulder, both assisted to Stratford Mountain House and then to Taranaki Base Hospital.

5/12/2012. North Canterbury Branch 68. Rural Fire. Woodend Beach. Fire in pine plantation. Call for two Forestry units to assist at a rural fire. AREC supplied comms/logistics for the Forestry units.

6/12/2012. Otago Branch 30. SAR Training. Mt Cargill near Dunedin City. The Land SAR portable repeater was setup on Mt Cargill so that several Land SAR members could conduct some radio coverage tests as part of their planning for an exercise.

8/12/2012. Southland Branch 37. Sports & Training. Dunsdale Picnic Area. Southland Section Training Exercise and end of year BBQ. Was a fantastic exercise, which included a full deployment of the section. Tasks included deployment and setup of HF antennas and the LandSAR Portable repeater. Sending and receiving messages via VHF and HF to field teams. Enjoyed by all.

9/12/2012. New Plymouth Branch 27. SAR. Dawson Falls, Mt Egmont. 3 persons overdue from day tramp. 3 persons located and walked to Dawson Falls

9/12/2012. Christchurch Branch 05. Sports & Training. Waimakariri River Gorge. Arawa Classic Kayak Race. Involves approx 180 kayaks racing through Waimakariri Gorge. Successful day with most kayaks completing the course successfully. Operations were carried out on 5.320 MHz (shore stations and jetboats), 146.575 MHz and APRS (144.575 MHz).

27/12/2012. Wairarapa Branch 46. SAR. Mitre Flats-Tararua Ranges. A women reported overdue by her father in the Mitre Flats area after failing to return to the pickup point at the agreed time. A team sent in that night to Atiwhakatu Hut to check log books but no sign of missing person. Teams sent in the next day and located her on way out, all OK, just delayed.

29/12/2012. Wairarapa Branch 46. SAR. Mid Waihone – Tararua Ranges. Search for Mountain runner over due from a day run around the Holdsworth-Jumbo circuit with only running gear and no over night gear and a small amount of food. Over 90 Search & Rescue members in 22 teams and IMT staff with 2 local helicopters and Air force Iroquois. Weather allowed helicopters to fly on the 3rd day and after checking the log book at the Mid Waihone hut, located the missing man walking out with only a few scratches and a broken toe.

Conclusion

Thanks to those who have contributed to this issue. Material for the next one to please be in our hands by 3 March 2013. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137. (N/B. Articles to please be in doc, rtf or txt format. Publisher or pdf we can not use. Thanks.)

Reminder

The next Section Leaders Nets should be 18 February and 18 March, 3900 kHz USB at 2030 hr NZDT unless notified otherwise. Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV*

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

Conditions in November and December were average with the SFI going down to around 90 and then struggling back to around 120. Surprisingly, early in that period the 10 m to 15 m paths over the South Pole to West Africa in the general area of Liberia and Nigeria were very good. Signals were S9 from an area traditionally the hardest to work from ZL, around 2300z, just before our lunch and later. 7P8D Lesotho and Mauritania 5T0SP were workable on several bands. Later in December there were few audible signals on any HF bands in the middle of the day, but the bands certainly livened up from dusk to dawn. I'm writing this just before Christmas and the long path into Europe on 15 m has been very good after 0900z.

Campbell Island

It was interesting to listen to the operators from Campbell Island ZL9HR. At some times their pile-ups were very audible; and massive. Despite arriving later than planned because of atrocious seas, they managed 42922 QSOs with 15 407 individual stations, including 627 with about 250 individual ZLs. As their nearest country it was easy for us to work them on multiple bands. Sometimes ZL9HR was audible and the pile-up wasn't, or vice-versa. The distance from my home to Campbell is only 1700 km, but as far as propagation is concerned, it may as well be on a different planet.

But would you put yourself through this to give the rest of the world a new country that you can't even claim yourself?

Day one of the journey to Campbell Island for the ZL9HR crew:

Coastal Forecast: Foveaux

Issued by MetService at 4.30pm Monday 26 Nov 2012

Valid to: Midnight Tuesday 27 Nov 2012

Forecast: *** Gale Warning In Force ***.

Westerly 40 knots. Sea very rough. Southwest swell rising to 4 metres. Fair visibility in showers developing this evening.

Outlook following 3 days: Westerly 40 knots, rising late Wednesday 50 knots with high sea, easing early Thursday morning southwest 30 knots, easing early Friday 20 knots then dying away late Friday. Heavy southwest swell easing Thursday.

From ZL9HR team member Gene K5GS. "The seas to the south were running 9-10 metres. The skipper was hesitant to subject his passengers to the beating we would certainly encounter in such conditions. He said he and the boat could handle those seas but it was just too risky for the passengers."

Also thanks to Gene and ZL4AS for the photos.

Believe it or not

The next item from 425 DX News on 15 December I must emphasize is not specific to any particular DXpedition and in my opinion is a most surprising attitude.

Heading out.

"Best practices for DXpedition operating:

We believe that much of the chaos on the bands during DXpeditions is caused by the operating tactics of the DXpedition operator. This leads to poor operating by DX-chasers, and therefore to chaos. At a meeting of RSGB, CDXC and GM-DX on October 13th we agreed to strengthen the 'DX Code of Conduct' and to prioritise the DXpedition side."

425 DX News then suggests various solutions for the DXpeditioner. I just can't agree with that. In my opinion the shambles on the bands when rare entities appear comes almost entirely from the DX community at large; not the DXpedition. My observation is that generally DXpedition operators are very competent and while occasionally they may have someone less experienced on their radios any shambles is down to those chasing the DX.

Of spotting, leader boards and dumbnuts

Spotting in DXing is the process of advising, via the internet, the current frequency of a station. These are often rare DX but there are even people who spot themselves. I wrote about spotting in the January 2011 column, and in April 2012 about the misappropriation by spotters of others' call-signs.

Before spotting appeared, hams kept an ear on the "DX" frequencies of the bands – 14 195 kHz for SSB was one. Some DXpeditions advised of their specific operating frequencies and worldwide the hams listened and waited for them to appear. Others appeared on DX nets, and some worked through a list made by their pilot stations. If the pile-up got too bad, often the DX would move frequency unannounced, and it would be up to us to find them all over again.

All this has been replaced by "spots", and to my mind it's to the detriment of ham radio. Nowadays many just watch the screen and click the computer mouse to go onto the frequency of the DX. While this is fine for "casual" DX, and handy when you get spotted and want to work many stations, it is having a down side when the DX is very rare.

Contests are now being won not always by the most excellent performers, but by those that get the most spots. DXpeditions are suffering much more QRM than in the pre-spotting days. During last November's appearance by the PT0S crew on St Peter and Paul Rocks, the DX community displayed some of the worst operating I have ever heard. Fortunately I had worked

The operating building.

Evohe skipper helping with antennas.

Glenn KY4KY and Jacky ZL3CW.

Team with banner.

that entity many years ago so didn't feel the need to spend time trying to make a contact

In one example, the PT0S operator was on 10 138 kHz and sending "PT0S DN". Well, maybe that was just an abbreviation for Dumb-Nuts, but those calling him above 10 138 weren't getting many contacts. Many calling were completely out of sequence; they transmitted while PT0S was transmitting, didn't stand-by when he gave a partial call; in fact, demonstrated very clearly they weren't hearing or understanding him at all. Basically they had seen the spot on the net, went there and transmitted. Sad to report, several were from the country that also gave us under-arm bowling.

Some of the abuse of PT0S on the spotting nets was probably libelous and I can't imagine what jollies operators who sit on the DX frequency with a carrier or continuous dots can get.

Usually I won't bemoan a situation unless I feel there is some solution. In this instance, I cannot think of much that can be done If you close down the spotting portals, or make them password protected like LOTW, others will appear. Dumbnuts will operate the way they always have, basically click then shout (or send their call-sign on CW constantly).

There are however a few ideas that may reduce the shambles. One is to discourage the rare DX sites from providing a leader board of those stations who have worked the rare DX the most. The need to work the DX on all bands and with all three modes is of course the prerogative of the operator. To do it properly from 160 m to 6 m requires 29 contacts by that operator; or 32 for those countries permitting operation on a 5 MHz frequency. (Phone operation is not allowed on 30 m by most countries.) Personally, it's not for me, particularly when you consider that to work all countries on all bands and modes requires nearly 10 000 confirmed contacts. In my opinion, there is no merit in the leader board scramble for very rare DX.

Readers will know that I am as keen a contester as anyone, but for the life of me I can't understand why it's necessary to turn DXpeditions into contests with leader boards. There are contests almost every weekend if that's your bag. The facility offered by many DXpeditions to see on the web whether your QSO(s) are in their log is invaluable, once appearing you don't need to work them for an "insurance" QSO, but why run a competitive leader board?

The first item from the Amateurs Code is: Considerate… Never knowingly operates in such a way as to lessen the pleasure of others.

Nowadays DXpeditions usually use the internet to apply for a DXpeditions QSL. To get a QSL card and LOTW confirmation, a flat fee of a small amount, around US$3-$5 is charged, and there is the opportunity to also make an additional donation. Many of us realize the costs in DXpeditions and add a little to the QSL fee.

My suggestion is that the DXpeditions change the fee structure; maybe US$5 for three confirmations and then an extra US$1 for every band/mode confirmed after that.

A recent innovation is automatic skimmers, they search the bands constantly and spot any DX suggested by their programmers. Are they really needed? Reverse beacons answer the propagation/is my antenna working question for you, or what about trying your very own CQ?

So my ideas are:

1. Only work the DX in the pile-up if you haven't got it confirmed.
2. Listen to the DX and be considerate.
3. Remove leader boards.
4. Change the fee structure for DXpedition QSLing.
5. Discourage use of automatic skimmers.

Still interested in going on a DXpedition; see the advertisement in this magazine.

SITUATION VACANT
DXpeditioner extraordinaire

We are looking for top CW, phone and digital operators for our next DXpedition. Successful applicants will travel to exotic locations around the world. Applicants will also need to be experienced with computers, antennas, propagation, and relate well to strangers.

Dangers may include, but are not limited to: drowning, freezing, diseases and dangerous animals. Lethal force may be encountered from pirates or terrorists or ethnic cleansers.

You will be expected to operate the radios for 24 hours each day and possibly may receive food and clean water. You will be subject to abuse on the air and by internet. Abuse will include being labeled deaf, stupid and racist. You will not be allowed to claim this exotic location for your own awards as you did not contact it from your own country. You will be subject to frequent performance reviews by operators whose major life experience was going unaccompanied to the mall.

Successful applicants will be expected to contribute only $8000.00, plus transportation costs to the official port of embarkation and provide their own bedding and any protective clothing. Applicants may be considered more favourably if they are able to supply the latest radio and computing equipment, but there is no guarantee the equipment will not be dropped into the sea, stolen or damaged by incorrect voltages. Applicants are recommended to arrange their own life, medical evacuation, and equipment insurance.

While the remuneration package is of a negative nature, you will receive the thanks and admiration of tens of thousands of other operators around the world.

If you are interested in this position, ask Matron for a pen when she comes around with your pills,

Send the attached application form, with 5 references, (which must include one from your bank manager) to the address below:

DXpeditions Unlimited
PO Box 0000.
Xanadu
Neverneverland

DXpeditions

Afghanistan T6LG till February 2013.
Angola D2FJZ for 2013.
Burkina Faso XT1T February 21 to March 7, there may be a second DXpedition at the same time.
Burundi maybe 9U4U 14 to 28 Feb approx.
Burundi 9U look for HA3JB, now living there. 20 m SSB and PSK31.
Clipperton Is TX5K February 28 to March.
Djibouti J28NC for the next two year.s
Easter Island XR0YG between March 20-27. Mainly CW 160-10 metres
Gabon TR Sebastien, F4EIH, will be in Gabon for at least three years.
Gough Island ZD9KX for one year. ZD9KN heard on the bands recently was a pirate.
Grenada J38RF mainly digital between February 6 and March 8.
Guadeloupe FG/F6ITD between February 1st and March 25.
Heard Island VK0HI proposed for 2014.
Juan Fernandez CE0Z early indications of activity from Robinson Crusoe Island mid 2013.
Jan Mayen JX9JKA till March.
Mayotte TO7BC March.
St Maarten PJ7 March.
Temotu H40T March 12th to 23rd.
Tokelau ZK3N prefix may change, April – May.

New Prefixes

England G100RSGB and similar call-signs will be heard in 2013 as RSGB celebrates its 100th jubilee.

Nets

ANZA Daily: DX net at 0515z on 14 183 kHz and now also Saturdays 0445z on 21 205 kHz. Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14 250 kHz; host JY5HX and features exotic Middle East calls.

ZL DXers: KiwiDX Summer SSB Net ZL1KDX 7.133 MHz +/-, Tuesdays 0700z, DX Cafe format, bring your own coffee !

What's on the air now? <www.dxsummit.fi/DxSpots.aspx >

QSL information: <www.qrz.com.>

Acknowledgements: 425 DX News, OPDX Bulletin, NC1L, K5GS, ZL4AS. Contact me at Call Book address, or by email at <graemeh@xtra.co.nz.>

WARO – nz womens amateur radio operators

with Topsy ZL2LS and Ngaire ZL2UJT
<waro@nzart.org.nz>

Happy New Year to all WARO members and readers. We hope that everyone had a great Christmas and New Year and spent some great times with family and friends, and are all relaxed and ready for the challenges that 2013 will bring to us all.

We, the editors of the WARO page for *Break-In,* would love to hear some of the adventures that you have been on over this Christmas break, so please send in the articles and some pictures that would be ready great. And also please don't forget to send them to Bev as well for the *WARO Bulletin* as well.

Annual Reports are due to the *Bulletin* Editor by the end of February for inclusion in the *Bulletin* prior to the AGM, so ladies please don't forget to have these done and sent to Bev, every little bit helps if we can get them to her early, many thanks

Conference 2013 Masterton

Conference this year will be held at Solway Park Hawthorne Hotel in Masterton over Queen's Birthday weekend; June 1 and 2. Registration form available from <www.nzartconference2013.co.nz>. A special rate is available for accommodation at the Copthorne.

It would be lovely to see as many as we can there, so start thinking about it and get your accommodation booked and if there are positions that need filling on the Executive please think about maybe filling one of these positions. More information re Conference in the next issue.

Thelma Souper Memorial Contest 2013

Unfortunately numbers have been low in taking part in this contest over the last few years, and it would be great to hear lots of WARO members and other YLs coming up and taking part. We didn't have this award in 2012 due to the lack of people the year before so please lets all support it this year. Many OMs enjoy this contest but they need more YLs to work them to keep them involved.

All members are asked to please support this event if possible.

The Thelma Souper Memorial Contest will be held on the 27 and 28 April 2013 from 0800z – 1000z on Saturday and Sunday evenings. All Contacts to be held on 80 meters phone or CW may be used. YLs contact YLs and OMs. OMs contact YLs and OMs. One contact with each station permitted in each half hour period. Call "CQ WARO CONTEST" exchange report, serial number (commencing 001) and name. To qualify as a multiplier WARO MEMBER stations must have contacts with at least 10 different stations.

A Bonus Station using the WARO call-sign ZL6YL will be in operation for random periods and will count as one multiplier on each night of the contest if worked. All radio regulations must be observed.

Scoring to qualify: Enter date at beginning of each evening. Each log must contain: Time of Contact, call-sign of station worked, cypher sent, cypher received and the name of the operator contacted and points claimed for contact.

- Score 5 points for each WARO contact including ZL6YL.
- Score 4 points for Non WARO YL contacts.
- Score 3 points for OM contacts

Multiply by the number of WARO members including bonus station if worked.

Logs to have each contact claimed as a multiplier underlined. Include a separate summary sheet showing: Your call-sign, name and address, the number of contacts, the number of WARO members worked, your score, declaration that all radio regulations have been observed. Logs that do not comply with all the above requirements will be disqualified.

LOGS

To reach the Contest Manager no later than May 15 2013. Send to: –

Bev Osborne ZL1OS.
34 Cobham Drive,
Kawerau 3127, New Zealand

No logs will be returned and No Correspondence will be entered into.

Awards

The highest scoring WARO member will be awarded the Thelma Souper Memorial Cup to be held for one year. The highest scoring OM operator will be awarded a trophy to be held for one year. Certificates will be awarded to: The first three WARO members, the first three OM operators, the highest scoring VK/YL operator.

Please note: Contacts made during the contest will count towards the NZ WARO Awards.

Branch 27 Rhododendron Festival Contest

We apologise that unfortunately we were unable to run this contest 2012 due to health problems within the executive committee, but at our AGM it was decided that we would definitely hold another this year 2013, maybe under another name as the Rhododendron Festival is no longer called this; now 'Power.Co Festival'. Will keep everyone informed in the next few months.

Nag Night Branch 26

September 19 2012 saw the NAGS take over the evening for another night. Both Topsy ZL2LS and Sharon ZL2BQ took 24 members of Branch 26 back to school. Yes we had a classroom set up type seating and Topsy was the teacher and Sharon the assistant finer!

We had a Trivial Pursuit type evening, with questions from New Zealand History, NZART Radio Question Bank questions and General knowledge questions. Well the class was very disruptive indeed, and the teacher had a very hard time controlling the students. Once into the questions, heads were down but the smart remarks from the students kept flowing hence the fines were getting rather large. Sharon ZL2BQ had to give up fining the students as she couldn't keep up with them. After 50 questions had been asked it was time to mark them. This was going to be interesting indeed, and it was. Most of the lads would be happy that they wouldn't have to sit their radio exam again, as these were some of the ones they got wrong!!, But alas one NAG Althea ZL2KAT got the one and only question right that everyone else in the class got wrong; just goes to show that us girls are as good if not better. We are just so smart.

After marking had been completed and not to mention that the teacher's answers were to be the correct answers, there was a lot of discussion re some answers but as per normal the teacher always is

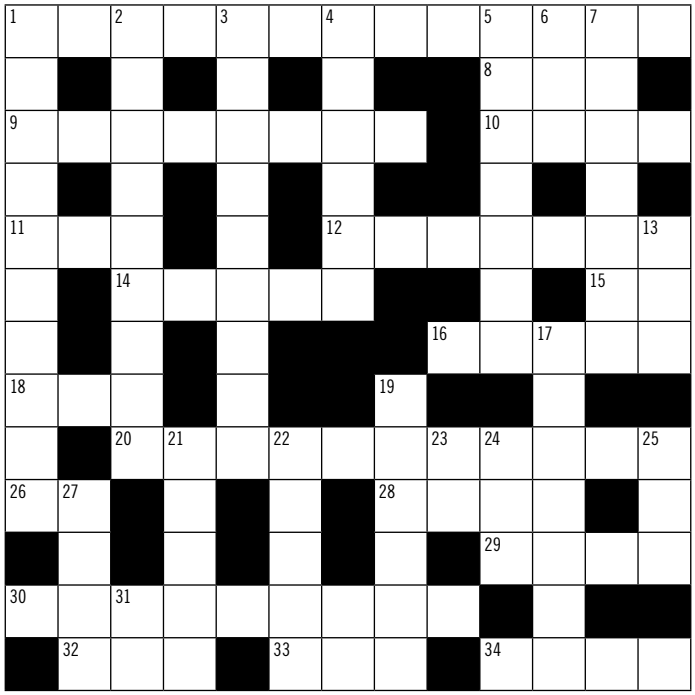
Nags Night; Topsy ZL2LS.

Nags Night; Nelson Branch 26, some of the class.

Foxhunting junior style, Benni left font.

ZL Crossword 20

Compiled by Graeme Hunt ZL1ANH



Across:

1. IC switches; bistable, monostable or astable. Often used for generating clock pulses.(13)
8. Lots of hair, or use to clean the bathroom floor (3)
9. & 4 down. Visited recently by the Hellenic Amateur Radio Assoc of Australia. (8, 6)
10. The great mirror for VHF DX (4)
11. Possess (3)
12. Part of an atom (7)
14. Wallpaper for your shack (5)
15. The negative (2)
16. Your encephalon (5)
18. Tahi (3)
20. Substances of very low electrical conductivity (11)
26. Phone home from Addis Ababa (prefix) (2)
28. Your encephalon lives in this (4)
29. Resistor digit colour is white (4)
30. Method of coupling in transformers (9)
32. Small child or a small measure of spirits (3)
33. Old Scottish expression for self (3)
34. Bobcat or chopper (4)

Down:

1. Acoustic to electric transducer (10)
2. Material is made by glueing two or more sheets – usually glued (9)
3. Sometimes present in open wire lines (9)
4. See 9 across
5. Current measuring machine (7)
6. As well (3)
7. Famous dolphin town (7)
13. French for 15 across (3)
17. Amount of high pH (7)
19. Some went there to eat their lunch, and a lot of fish (6)
21. The signal or current fed into a circuit (5)
22. Elevators, but not on a plane (5)
23. Particle determiner singular and plural, Maori (2)
24. Moved at rapid pace so that both feet are off the ground together for part of each stride (3)
25. Who must be obeyed (3)
27. Camping house (4)
31. Perform a deed (2)

Answers on p40

correct. Chocolate fish were given out for various reasons, those being getting the most correct at the number we were up to, or just being a good student. The highest score to be obtained was 52 with two questions having 2 points. Peter Thompson ZL2PHS got 37 out of 52 so was deemed the winner, who duly received a nice bottle of wine for his effort.

The Nags then put on a home-made baking supper for the club which was greatly received. A fun night was had by all, and they are waiting for next year to see what we come up with next.

Topsy Scott ZL2LS

Call Book

If you know of anyone who over the past few years has become a silent key, please fill in the form in *Call Book* on page 2-1 with the details. It is unfortunate but some of our members have seen their own call-signs still in *Call Book* under the silent key's name and address. It is up to us to keep this up to date so please check. There is a whole page of information for you to follow and it is very important to keep this up to date.

Next ALARA Meeting 2014

The next ALARA meeting will be held in Port Stephens, Nelson Bay, New South Wales, Australia. Dates are from: Friday 24 until Monday 27 of October 2014

Contact person: Anjes Tobbe VK-2GWI, Email Address: <anjes@tobbe.net.au> or website <http://alarameet.com> for further information. If you are interested please contact Anjes and she will give you further information.So ladies if you are interested in getting group together to go now is the time to start thinking about it.

Break-In articles

Please remember to support your *Bulletin*, your WARO page in *Break-In* and most of all your fellow WARO members who take the time to get competitions up and running for us and to have no one support them is sole destroying, so please remember you only get as much back as what you put into something,

Articles have been coming in which is really great so keep them coming as it makes our work a lot easier and makes your WARO page and *Bulletin* more interesting. The next deadline for articles for *Break-In* is March 10 so please send them on in. Thanks

Please note that when sending articles please send to our email address <waro@nzart.org.nz> as if one of us is away then the other does not get copy.

Old copies WARO magazines

Old copies of the WARO magazine are being asked for so please, if you have some that you would like to donate to WARO, or know of families who have had Silent Keys and they would like to donate them to WARO, please send them to Joeline ZL1UJB as she is happy to store these. They will be great for new members, and just to have a full collection for the history of WARO in New Zealand.

Snippets from around the world

Nina DL2GRC also known as VK21NZ who comes often to Australia and belongs to ALARA has a 4 year old son named Benni who she has introduced to fox hunting. Lovely to see young people being introduced to the hobby of radio.

We encourage you to keep our wonderful organization running for the fun and friendship it creates. Please participate in just one thing during the year where amateur radio for woman will benefit, and it will help us all. We are only a minority but very important as women hold many positions in clubs around New Zealand and I'm sure are respected for contributing. Enjoy 2013

Topsy ZL2LS & Ngaire ZL2UJT

Around the Branches

RadioTek – Another day of radio technology at Branch 05

The RadioTek machine continues to roll on, introducing the delights of radio building to more victims, young and not so young. On Sunday 14th November the rain stopped early and the water level in Lake 05, as we call our carpark, started to drop. Ten RadioTek students attended the fourth and last Radiotek of 2012, with six first timers in attendance, and we were honoured to have Margaret, XYL of Ken ZL3KD, join us to finish her radio with us.

The day ran the usual course, where the first timers had a quick introduction by ZL3APB on how radio waves work, then into some soldering practice before morning tea, and then their first project of a steady hand game. The second timers were taken through learning about electricity and meters by ZL2BAT, whilst the third timers were shown some effects of tuned circuits by ZL3KB.

After lunch the first timers started the next project of a simple AM radio, and when it was finished they all had a go at running it from a solar cell, a kiwi fruit battery and a miniature steam engine.

Daniel deserves a special mention. He has now been three times and had completed the steady hand game, and the AM radio with speaker amplifier on previous visits. This time he made the FM receiver, and he completed it with almost no help from us. At "turn on" time, it was only a faulty switch that stopped it from working first time! This was quite impressive, and he helped his brother make his radio too.

As it came towards the end of project building it was interesting to see the desperation to finish their radios, almost to the point of not being able to keep their hands steady, so none of them could win at their own steady hand game.

By the end of the day, we had a full set of very happy students, and parents, going home with fully working projects. The team Rory ZL3HB, Brian ZL2BAT, Des ZL3AK, Barry ZL3BMW, Aidan ZL3APB, Ron ZL-3RON, Rod ZL3ROD, Kelvin ZL3KB would like to thank themselves for the preparation work and sacrificing a Sunday to have fun.

The next RadioTek day is scheduled for 3rd March 2013, and this will probably be the last radioTek at the Galbraith clubrooms as we are due to vacate the premises in April. A new clubroom has yet to be found, so it is not certain we will be able to use it for RadioTek.

If you want to help us spread the word, the booking contact details are Rory Deans 03 344 6292 or <rory1@xtra.co.nz> with our website at <http://www.radiotek.org.nz/>

Reporter Kelvin Barnsdale ZL3KB
18 November 2012

Branch 26 – Nelson Amateur Radio Club

Nelson Amateur Radio Club Life members, members, partners and friends gathered on Saturday 22 of September in the Ken Ching Room at the Nelson Suburban Club to celebrate the 80th Anniversary of Nelson radio amateurs becoming a Branch of NZART.

The evening commenced with a welcome from Branch President Paul Moffatt ZL2PO. Special thanks went to NZART Vice-President Stuart Watchman ZL2TW and the members of the Marlborough Branch 22 who had journeyed to Nelson for the anniversary celebration. Paul ZL2PO remarked that it was 80 years ago on the 21 of September in 1932 that a meeting of members of NZART and others interested in the Association had been held in the billiard rooms of Clary Munro ZL2LI at 132 Bridge Street in Nelson. The *Break-In* of late in 1932 had reported that the Nelson gang had discarded the cobwebs and had become a real live Branch of both NZART and the Radio Emergency Corp.

To mark the Nelson Branch's 80 year association with NZART ZL2PO said that the Branch would make a special donation to NZART targeted directly to IARU activities. He then presented a cheque to NZART Vice-President Stuart ZL2TW. After words of thanks from ZL2TW on behalf of NZART and reference to the long and special friendship that exists between the Marlborough and Nelson Branches it was over to an evening of conversation, fantastic food and drinks concluding some hours later with tea and coffee and a piece of the special 80th Anniversary cake baked for the occasion by Bruce ZL2BU.

Reporter Jim Meachen ZL2BHF

The Nelson Branch 80th Anniversary Dinner Participants.

A few of the November Radiotek students.

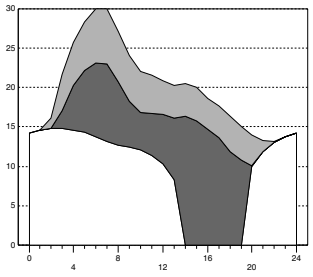
Daniel and his FM radio.

Margaret XYL of ZL3KD.

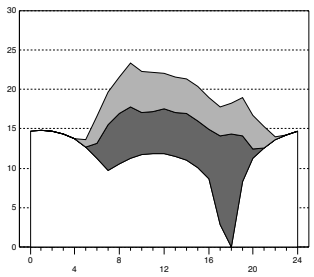
Stacey and the screwdriver.

Ionospheric Predictions

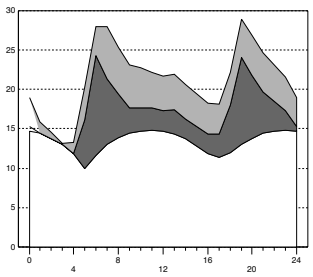
MARCH / APRIL 2013 **T-index = 88**



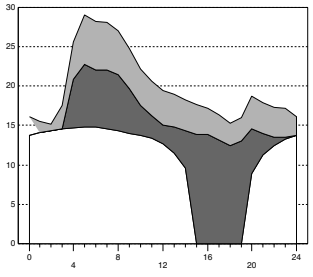
WN-
Moscow
(SP)
16548 km
312°



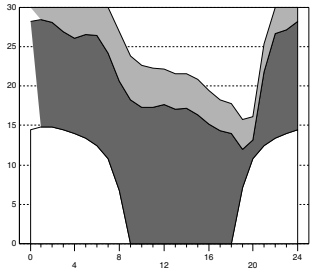
WN-
London
(SP)
18814 km
343°



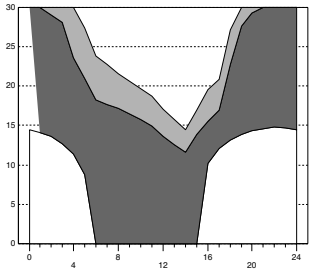
WN-
Jo'burg
(LP)
28265 km
31°



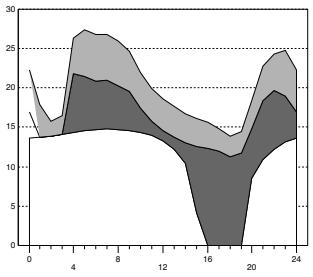
WN-
Istanbul
(SP)
17168 km
281°



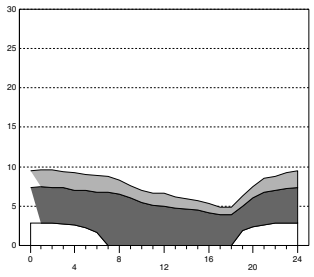
WN-
Tokyo
9274 km
332°



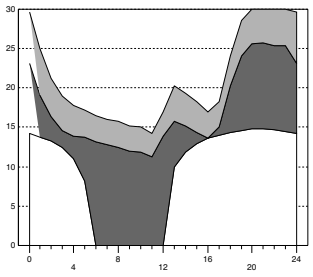
WN-
San
Francisco
10859 km
45°



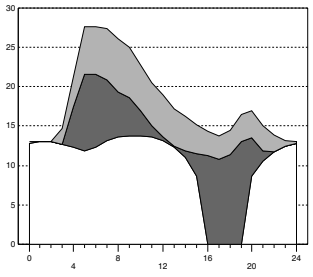
WN-
Cairo
16519 km
261°



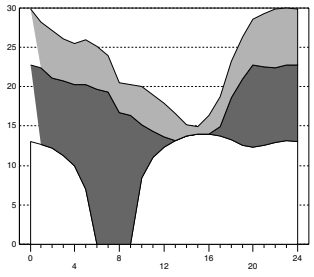
WN-
New
Zealand
300 km



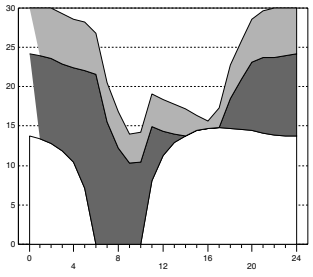
WN-
New
York
14402 km
66°



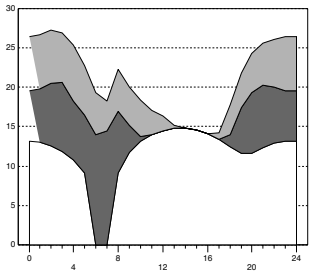
WN-
Jo'burg
(SP)
11759 km
211°



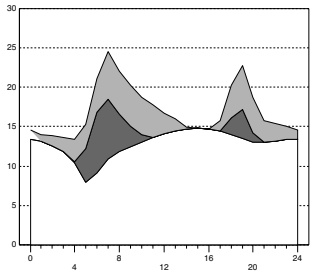
WN-
Rio de
Janeiro
11780 km
144°



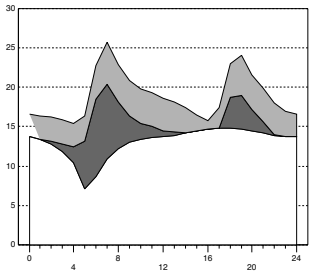
WN-
Barbados
13962 km
104°



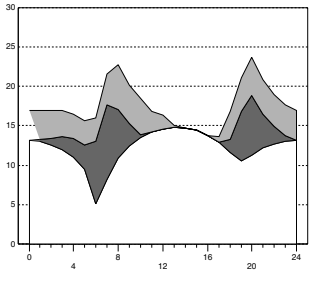
WN-
Dakar
16862 km
155°



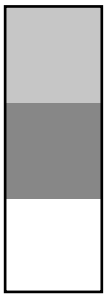
WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°



Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

HAMADS

WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Telephone (09) 528-2022 or E-mail <paul.ssegrub01@gmail.com>

WANTED: Kenwood AT-250 Antenna Tuner complete with cables, PS-50 Power Supply, Kenwood Filtered External Speaker Unit. ZL1ALT. Telephone (07) 856-1064 or Mobile (027) 815-9129.

WANTED: Frequency Meter BC221 or similar preferably in working condition with or without AC Supply. ZL2AYF. Telephone (04) 232-6378 or E-mail <brian.amies@yahoo.co.nz>

WANTED: Valves wanted to purchase, fair price paid, all types but esp following types ECC32 ECC33 ECC34 ECC35 B65 6SN7 6SL7 ECC81 ECC82 ECC83 ECC803S ECC88 E88CC E188CC 7308 EF86 KT61 KT66 KT88 EL34 EL37 PX4 PX25 GZ32 GZ33 GZ34 GZ37 CV378 CV575 VT52 45 50 211 801 805 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St., Lyttelton 8082. Telephone (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>

FOR SALE: Yaesu FT-470 UHF/VHF Handie Transceiver full dual band very good order with operating manual. Nicad pack needs repacking. Mains and car chargers. Dry battery pack. Price – $180. ZL3COL. Telephone (03) 313-2303 or E-mail <colingr@xtra.co.nz> or *Call Book* Address.

FOR SALE: Elecraft K1 5 watt Transceiver. 80 and 40 metre module and Auto ATU installed. See Elecraft website for specs – <http://www.elecraft.com/k1_page.htm>. Offers. Malcolm ZL1AOM. Telephone (07) 871-4964 or *Call Book* Address.

FOR SALE: Power Supplies: 1 x Trotman 13.8V DC 5 amp, 1 x Southern Cross 13.8V DC 30 amp and co-axial relay – Model CX-230 (Toyo Tsusmo). All in good working order. Offers on all items. ZL2RG. Telephone (06) 753-5761 or E-mail <saloon351@gmail.com>

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

WANGANUI JUNK SALE

Returning by popular demand !!!!

Saturday May 4, 2013. Auction starts at 10am.
Wanganui Intermediate School Hall. Dublin St, Wanganui.
(same venue as last time)
Lots accepted from 4pm on Friday 3rd.

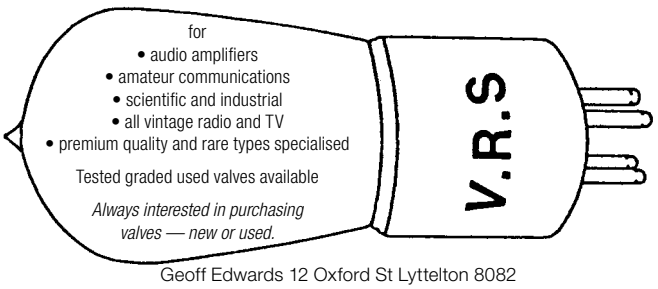
SALE CONDITIONS:
Sellers pay 15% commission with a max of $20 on any one item.
Accounts will be run. (to be settled on sale day before goods uplifted)
Bids will be possible only by registered bidder number.
Bidders must register with a $5 fee. This will also cover the sale catalogue.
Cash, Cheque or EFTPOS accepted.

Clean out your shack and help us kick-off this iconic sale again!

For further information contact Graham Hawtree ZL2AHR
PH: 06 3447501 <grahamandval1@xtra.co.nz>
or Jeff Howe ZL2THO PH: 06 3444302 <howejef@clear.net.nz>

VALVE RADIO SPARES

Importers and stockists of quality valves of all types and related items


for
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ph 0274 338452 or 03 3289208 fax 03 3289207 email tubehead@xtra.co.nz

Te Puke Amateur Radio Club Inc.

Annual "Junk Sale" – Saturday 2 March 2013

Paengaroa Community Hall, Old Coach Road, Paengaroa.

Open 06.30am, Sale at 10.00am.
$20.00 Per Table or $25.00 on the day,
$12.00 For Half a Table or $15.00 on the day.

WARO get-together at 10.30am.

Hot Breakfast from 07.30am.

Be Here To Win 1 only Icom ID-31A D-Star UHF Digital Transceiver
$10.00 A Ticket

Cannot find us, tune-in to 7175 or 680 for directions.

For Further Information and Table Bookings:
Ph. (07) 533 1029 or Email: <syd.rowe@xtra.co.nz>

Answers to crossword No. 20 from p37

Across: 1 multivibrator, 8 mop, 9 Campbell, 10 moon, 11 own, 12 neutron, 14 award, 15 no, 16 brain, 18 one, 20 dielectrics, 26 ET, 28 head, 29 nine, 30 induction, 32 tot, 33 sel, 34 lynx.

Down: 1 microphone, 2 laminated, 3 imbalance, 4 island, 5 ammeter, 6 too, 7 Opononi, 13 non, 17 acidity, 19 school, 21 input, 22 lifts, 23 te, 24 ran, 25 she, 27 tent, 31 do.

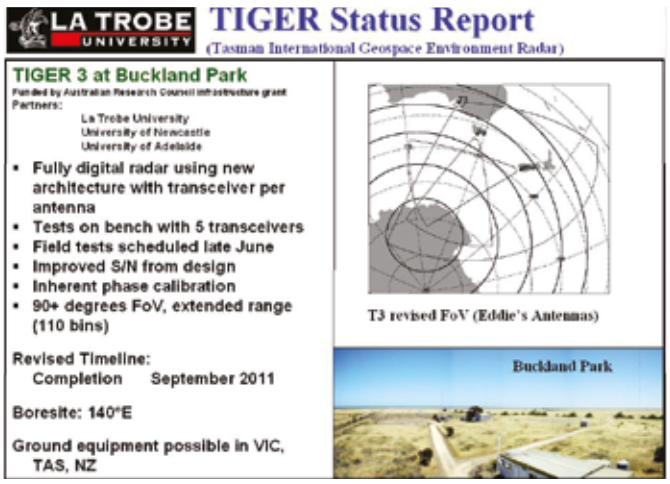
Next deadline for copy is 10 March 2013

80th Anniversary Dinner – Nelson Branch 26.

Screen-shot of HDSDR receiving AM.

ZL9HR Team with banner.

ZL1TPH portable.


LA TROBE UNIVERSITY
TIGER Status Report
(Tasman International Geospace Environment Radar)
TIGER 3 at Buckland Park
Funded by Australian Research Council infrastructure grant
Partners:
La Trobe University
University of Newcastle
University of Adelaide
Fully digital radar using new architecture with transceiver per antenna
Tests on bench with 5 transceivers
Field tests scheduled late June
Improved S/N from design
Inherent phase calibration
90+ degrees FoV, extended range (110 bins)
Revised Timeline:
Completion September 2011
Boresite: 140°E
Ground equipment possible in VIC, TAS, NZ
T3 revised FoV (Eddie's Antennas)
Buckland Park

VK5 radar-status report.

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D-STAR
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